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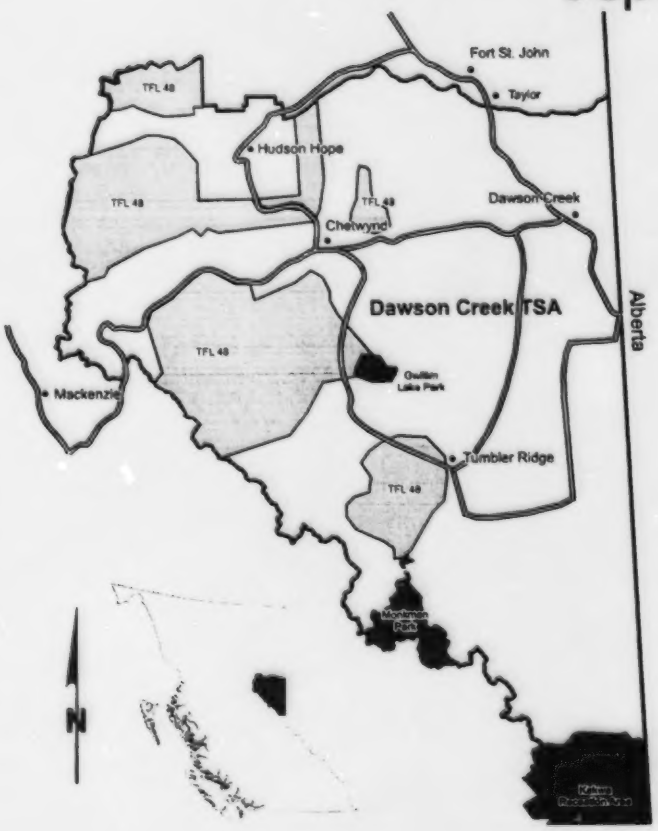
Timber Supply Review

Dawson Creek Timber Supply Area

Information Report
September 2000



BRITISH COLUMBIA
Ministry of Forests

100-07579/

Introduction

The British Columbia Forest Service is required by law to formally review the timber supply* in all timber supply areas* and tree farm license* areas in the province. A review of each of the areas is completed at least once every five years. The main objectives of the reviews are:

- to identify the economic, environmental and social information that reflects the current forest management practices—including their effects on short- and long-term timber supply
- to identify where improved information is required for future timber supply forecasts
- to provide the chief forester with information to make any necessary adjustments to the allowable annual cuts* for the next five years

> * *Throughout this document, an asterisk at the end of a phrase or word indicates that a definition can be found in the margin.*

Objective of this document

The objective of this document is to provide an opportunity for public review of the draft data and management assumptions that will be applied in reviewing the timber supply for the Dawson Creek timber supply area. This document represents the early stages of the timber supply review process and is intended to provide a non-technical overview of the data and management assumptions that will be used in the upcoming *Dawson Creek Timber Supply Area Analysis Report*.

The *Dawson Creek Timber Supply Area Analysis Report* will be one of the documents that the chief forester will consider in making the allowable annual cut determination under Section 8 of the *Forest Act*. Public input is encouraged to ensure the best information is used in determining allowable annual cuts.

This report contains a general description of the data assumptions and current forest management practices related to timber supply for the Dawson Creek timber supply area. For the purpose of this timber supply review, current practices can be defined as the set of land-use decisions and forest management practices that are currently implemented and enforced. Future forest management objectives that may be established but are not currently implemented and enforced are not included.

Many of the draft data and management assumptions are summarized on pages 6 through 10. For a more detailed description of the information, please contact the Dawson Creek Forest District office in Dawson Creek, or the Prince George Forest Region office in Prince George and request a copy of the data package. The public will have 30 days to review and comment on the information report and data package. A response form at the end of this document will help you prepare your comments. Written comments will be accepted until October 12, 2000.

Timber Supply Review process

In British Columbia, a process for determining allowable annual cuts has been in place since the late 1940s. However, the process has changed significantly over time. Most recently, the process has had some minor revisions designed to improve efficiency and encourage earlier public review through the release of this report.

Figure 1 (next page) illustrates the five-step process that has been developed for the timber supply review of timber supply areas. The diagram indicates the current status of the timber supply review for the Dawson Creek timber supply area, and the estimated time required for each step.

Timber Supply Review
in the Dawson Creek TSA

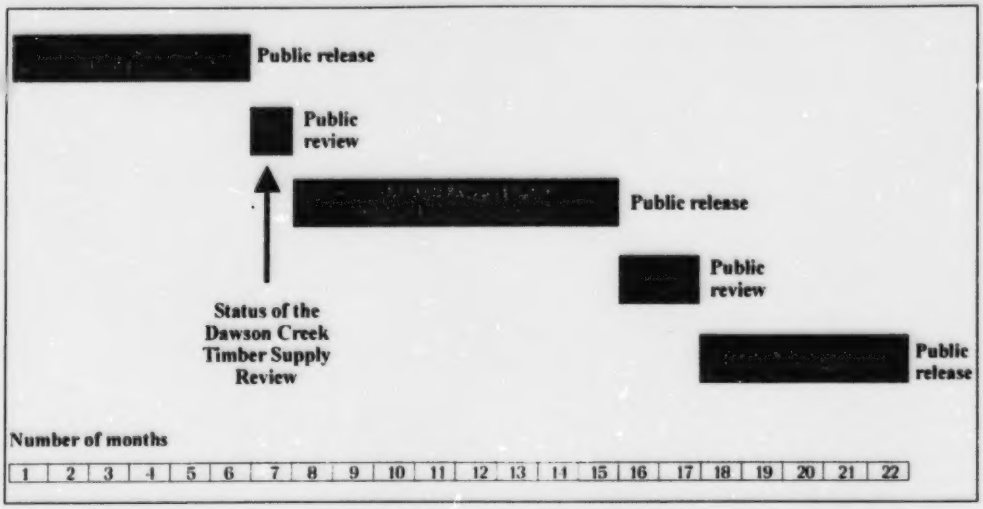
Timber supply
A harvest level that is forecasted to be available over time, under a particular management regime.

Timber supply area
An integrated resource management unit established in accordance with Section 7 of the *Forest Act*.

Tree farm licence
Provides rights to harvest timber, and outlines responsibilities for forest management, in a particular area.

Allowable annual cut (AAC)
The rate of timber harvest permitted each year from a specified area of land, usually expressed as cubic metres of wood per year.

Timber Supply Review
in the Dawson Creek TSA


Public release
Public review
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Public review
Public release
Status of the Dawson Creek Timber Supply Review
Number of months
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Figure 1.
Status of the timber supply review process for the Dawson Creek TSA

The process for reviewing the timber supply and establishing the allowable annual cut for tree farm licence areas is based on similar principles; however, the process takes 30 months from start to completion. By the end of 2001, a new review process for all tree farm licences will only require 20 months for completion.

The chief forester's responsibility

Determining the allowable annual cuts for Crown forest lands in British Columbia is the responsibility of the province's chief forester. It is one of the chief forester's most important responsibilities since it affects the local and provincial economies and environment—now and in the future. Section 8 of the *Forest Act* requires the chief forester to consider the following factors to determine allowable annual cuts for timber supply areas and tree farm license areas:

a) the rate of timber production that may be sustained from the area, taking into account:
   - the composition of the forest and its expected rate of growth
   - the time in which the forest will become re-established
   - silvicultural treatments, including reforestation
   - standards of timber utilization
   - constraints on the amount of timber produced from the area due to use of the forest for purposes other than timber production
   - any other information which relates to the capability of the area to produce timber

b) the short- and long-term implications to the province of alternative rates of timber harvesting from the area

c) the nature, production capabilities and timber requirements of established and proposed processing facilities

d) the economic and social objectives of the Crown for the area, the region and the province, as expressed by the minister of forests

e) abnormal insect or disease infestations and major salvage programs planned for the timber on the area

Some of these factors can be measured and analyzed—others cannot. Ultimately, the chief forester's determination is an independent, professional judgement based on the best available information. Information that is relevant to the factors listed above is provided to the chief forester by government agencies, the minister of forests and the public.

One of the objectives of the Timber Supply Review is to incorporate changes arising from new information, new practices and new government initiatives

that may have an impact on timber supply. In the event of significant change, the allowable annual cut may be reviewed in less than the required five years.

Following the release of the allowable annual cut determination by the chief forester, the minister of forests apportions the cut to various licenses and programs.

Principles of the Timber Supply Review

In determining allowable annual cuts—in addition to the requirements outlined in Section 8 of the *Forest Act*—the following principles have been developed.

The Timber Supply Review:

- is a decision-making process for establishing allowable annual cuts for timber supply areas and tree farm licence areas by the chief forester on a maximum five-year cycle, as required under Section 8 of the *Forest Act*; **it is not a process for making land-use or management decisions**
- incorporates the best information available, including all relevant current practices, and identifies where new information is needed
- reflects the results of implemented plans and land-use decisions, and provides a benchmark for future planning processes
- involves other agencies, affected groups and the public.

Dawson Creek Land and Resource Management Plan

The Dawson Creek Land and Resource Management Plan was approved by Cabinet in March 1999. The objective of the plan is to guide resource management activities, reduce land and resource use conflicts, and to provide economic security for resource development. The plan includes recommendations regarding new protected areas*. Although the new protected areas have received government's final approval, they are not expected to be formally designated by an order-in-council until 2001.

Currently, no higher level plans* have been established for the timber supply area. Therefore, only land-use planning decisions affecting forest practices that have final approval from government will be reflected in the timber supply review.

Description of the timber supply area

The Dawson Creek timber supply area is situated in the northeastern interior of the province and covers a total area of approximately 2,278,000 hectares. The timber supply area is bounded to the north by the Peace River and to the east by the Alberta border. To the west is the Hart Ranges and to the far south lies the Front Ranges, which are characterized by mountainous terrain and steep valleys of the Rocky Mountains. The area also encompasses the rolling terrain of the Peace and Hart Foothills, and the relatively flat Kiskatinaw Plateau. Major tributaries of the Peace River in the area include the Pine, Moberly, Sukunka, Murray, and Kiskatinaw Rivers.

The timber supply area is administered from the Dawson Creek Forest District office located in Dawson Creek. The Forest District boundary covers a larger area that includes Tree Farm Licence 48.

The communities

The major communities in the timber supply area include the City of Dawson Creek, the Districts of Tumbler Ridge, Chetwynd, and Hudson's Hope, and the Village of Pouce Coupe. Three aboriginal communities in the timber supply area include West Moberly First Nations, Saulteau First Nations, and the Kelly Lake Community.

Protected area
A designation for areas of land and water set aside to protect natural heritage, cultural heritage or recreational values (may include national park, provincial park, or ecological reserve designations).

Higher level plans
Higher level plans establish the broader, strategic context for operational plans, providing objectives that determine the mix of forest resources to be managed in a given area.

In 1999, the population of the Dawson Creek TSA was an estimated 29,144, reflecting a slight decline of 1.3 per cent since 1996. This decline is mostly due to a 17.6-per cent reduction in the population of Tumbler Ridge. The population in the remaining municipalities was relatively stable, except for Chetwynd, which had an increase of 3.6 per cent from 1996 to 1999. In 1999, the estimated population of Dawson Creek was 11,812; Chetwynd was 3,059; Hudson's Hope was 1,152; Pouce Coupe was 928, and Tumbler Ridge was 2,858. From 1999 to 2005, the population of the Dawson Creek TSA is expected to decrease by approximately 8 per cent.

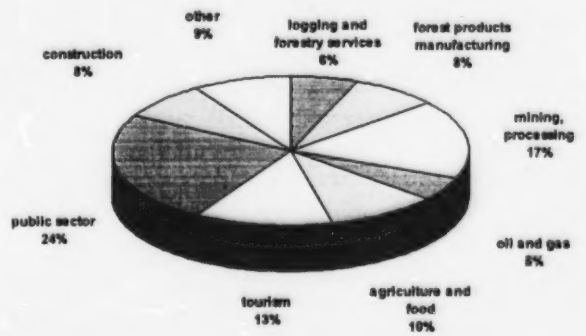

Figure 2. Total employment by sector for the Dawson Creek timber supply area, 1996.

Note: percentages are based on the total direct, indirect and induced employment supported by each sector. 'Other' includes employment not included elsewhere and jobs supported by transfer payments such as employment insurance, social assistance, pension and investment income.

Source: The 1996 Forest District Tables, April 1999. Ministry of Finance and Corporate Relations.

Indirect and induced jobs
Indirect jobs are supported by direct business purchases of goods and services. Induced jobs are supported by employee purchases of goods and services; for example, at retail outlets.

First Nations

The Dawson Creek timber supply area lies completely within the area outlined as Treaty 8 Territory. Both the West Moberly and the Saulteau First Nations are signatories of Treaty 8 and have reserves and traditional territories within the Dawson Creek timber supply area. Three other First Nations communities (Halfway River First Nations, Lheidli T'enneh Band, and McLeod Lake Indian Band) have traditional land-use interests within the timber supply area. The McLeod Lake Indian Band recently signed agreements adhering to Treaty 8; and has indicated that their traditional land use area encompasses the Dawson Creek Forest District.

In addition, a significant number of Metis and other aboriginal peoples reside within the timber supply area including those located at Kelly Lake.

The economy

The economy of the Dawson Creek timber supply area is largely resource-based with the mining, oil and gas, and forestry sectors supporting approximately 36 per cent of the timber supply area's total employment. Local logging and processing activity not only relies on the timber supply area for its supply of timber, it is also supported by other timber harvested from Tree Farm Licence 48, other adjacent timber supply areas, and private sources.

The public service is the leading employment sector in the timber supply area supporting approximately 24 per cent of the total labour force. Other important sectors that provide the area with a relatively diversified economy include the agriculture and food sector (10 per cent), tourism (13 per cent), and construction (8 per cent). Figure 2 illustrates total employment by sector for the area.

The resource sectors have the greatest impact on the local economy through the purchases made by resource companies (indirect impacts) and by the spending of resource company employees (induced impacts). For example, for each 100 direct jobs in the forestry sector, a further 33 to 69 indirect and induced* jobs are supported in the community, and the mining and oil and gas sectors support a

Biogeoclimatic zones
A large geographic area with broadly homogeneous climate and similar dominant tree species.

further 60 jobs in the community. In contrast, the public sector supports a further 14 jobs, the agriculture and food sector supports a further 18 jobs and the tourism industry supports seven additional jobs for each 100 direct tourism jobs.

The forest land resources

Numerous natural resources are associated with the forest land base. Forest products, recreation, ranching, oil and gas exploration and development, mining and tourism, and a variety of wildlife habitats highlight the wide range of resource uses in the Dawson Creek timber supply area. The diverse terrain results in distinct climates and vegetation across the timber supply area. These include mountains and river valleys in the west supporting predominantly Engelmann spruce – subalpine fir forests, and the plateau in the east dominated by boreal spruce and trembling aspen forests. Parks, recreation sites and trails, and roaded and non-roaded areas provide opportunities for numerous outdoor activities. The parks within the timber supply area include Monkman, Gwillim, and Kakwa Provincial Parks. Recreation areas within the timber supply area include Kinuseo Falls, Moberly Lake, Stewart Lake, Wapiti-Onion Lake, One Island Lake, and Williston Lake. The mountainous terrain and lakes in the timber supply area provide a wide range of opportunities for recreation activities including mountain-biking, all-terrain-vehicle use, horseback riding, hiking, spelunking, hunting, camping, boating, cross-country skiing and snowmobiling.

The environment

There are four biogeoclimatic zones* in the Dawson Creek timber supply area. The distinct ecological features and the unique nature of the area contribute to high biodiversity* values. The low elevation areas within the timber supply area are characterized by boreal forests of black and white spruce and trembling aspen. Riparian* areas along the foothills support sub-boreal forests of white spruce, lodgepole pine, and subalpine fir stands. High elevation forests include stands of Engelmann spruce and subalpine fir. Alpine areas support shrubs, herbs and lichens adapted to a high elevation environment.

The diverse forests host a range of wildlife species, some of which are considered rare and potentially threatened by human activities and natural events. Examples of wildlife that have been identified as requiring special management in the Dawson Creek timber supply area are the northern goshawk, bull trout, fisher, and grizzly bear.

History of the allowable annual cut

In December 1996, the chief forester set the allowable annual cut (AAC) for the Dawson Creek timber supply area at 1,733,033 cubic metres (effective December 30, 1996). This AAC is currently partitioned as follows:

- 846,533 cubic metres are attributable to coniferous*-leading stands, of which at least 100,000 cubic metres must be from small-diameter pine stands; and
- 886,500 cubic metres are attributable to deciduous*-leading stands.

As part of the 1996 determination, the chief forester gave direction to resolve uncertainties with respect to the timber supply in the Dawson Creek timber supply area. In preparation for the upcoming allowable annual cut determination, the following issues were examined:

- **mixed-wood* stands** - in the last determination, the chief forester noted the importance of defining a management strategy and objectives for mixed-wood stands.

Timber Supply Review
in the Dawson Creek TSA

Biodiversity (biological diversity)
The diversity of plants, animals and other living organisms in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, as well as the evolutionary and functional processes that link them.

Riparian habitat
The stream bank and flood plain area adjacent to streams or water bodies.

Coniferous
Coniferous trees have needles or scale-like leaves and are usually 'evergreen'.

Deciduous
Deciduous trees commonly have broad-leaves and usually shed their leaves annually.

Mixed-wood
Forests that have a mix of coniferous and deciduous trees.

Environmentally sensitive areas
Areas identified as requiring special management to protect important recreation and scenic values, fisheries resources, sensitive soils and unstable slopes.

Integrated resource management
The identification and consideration of all resource values, including social, economic and environmental needs, in resource planning and decision-making.

Forest Practices Code
Legislation, standards and guidebooks that govern forest practices and standards, with heavy penalties for violators.

Sensitivity analysis
Examines how uncertainty in data and management assumptions affect timber supply.

Since then, the Prince George Forest Region has undertaken a study to assist in the development of guidelines for managing boreal mixed-wood stands. As well, the district is working on a strategy specific for the TSA. This information will be considered in the upcoming determination.

- **use of herbicides** - the chief forester noted in the last rationale that he encouraged the district to resolve the issues associated with use of herbicides in regenerating stands, and explore alternatives to herbicides. Since then, the BC Forest Service has developed a pesticide management plan that BC Environment is implementing. The plan will provide additional information for examining timber supply.
- **reinventory** - in the last determination, the chief forester noted that the timber supply was based on older forest inventory information and should be reinventoried. New inventory data for the timber supply area have been gathered, and environmentally sensitive areas* have been updated. This information will be used for the upcoming timber supply analysis.
- **volume partition for small-diameter lodgepole pine stands** - monitoring of the amount of harvesting in small-diameter lodgepole pine stands was to be undertaken, however licence agreements have not yet been finalized.
- **unsalvaged losses** - in the previous determination it was noted that an estimate of unsalvaged loss for deciduous stands should be developed. The district staff and industry are currently working on developing an estimate of unsalvaged losses for deciduous stands.

Note: For more information on these points, please refer to the Dawson Creek Timber Supply Area Rationale for Allowable Annual Cut Determination, December 1996.

Current timber supply review

Public forest lands in British Columbia provide recreational enjoyment, fish and wildlife habitat, water supplies, timber resources and many other benefits. The Ministry of Forests manages the timber, range and recreation resources on public lands, and the Ministry of Environment, Lands and Parks manages fish, wildlife, water resources and parks. Both agencies subscribe to the principle of integrated resource management*, where all resources are considered when making forest management decisions.

The Forest Practices Code* is now law and has been fully implemented in the timber supply area since June 15, 1997. The new practices may influence both the short- and long-term timber supply.

The data and management assumptions that will be used in the timber supply analysis will be based on the existing land-use designations and resource management practices that are currently approved and implemented in the Dawson Creek timber supply area. Uncertainties about some of the data regarding current practices, and their potential effects on timber supply will be examined through sensitivity analyses*. The chief forester will also consider any new information, based on implemented changes, at the time of the allowable annual cut determination.

Draft data and management assumptions for public review

The public is encouraged to review the data and management assumptions for completeness and accuracy. In determining an allowable annual cut, the chief forester will consider these assumptions as required by Section 8 of the *Forest Act*. The following general outline contains a brief description of the more pertinent information that will be

used in the timber supply analysis and, subsequently, in the chief forester's allowable annual cut determination for the Dawson Creek timber supply area. More detailed information can be found in *Appendix A: Data Package*. This appendix is available upon request from the Ministry of Forests offices listed at the end of this report.

Land base factors

- **operable area** - the forested area in the Dawson Creek timber supply area has been assessed for operability* based on soil and slope types. For example, areas with fine-textured soils on slopes greater than 80 per cent are considered sensitive and unavailable for harvesting. Forest Service staff have defined areas of operability in consultation with the local forest industry. Only those areas that are considered operable will contribute to the timber harvesting land base.
- **forest types not currently being harvested** - these are forest types that are currently not utilized in the Dawson Creek timber supply area due to terrain or economic limitations. Generally these are forest types with a low volume per hectare, and therefore have low merchantability (sometimes called problem forest types). These types of stands will not be included in the timber harvesting land base.
- **protected areas** – recommendations of the *Dawson Creek Land and Resource Management Plan* resulted in the implementation of 12 new parks and 4 protected areas including Bocock Peak, Butler Ridge, Hole-in-the-Wall, Pine LeMoray, Pine River Breaks, Wapiti Lake and Gwillim Lake and Kakwa. In the timber supply analysis these new parks and protected areas will be excluded from the timber harvesting land base.
- **forest roads** – the amount of productive forest land base occupied by forestry-related roads, as well as oil and gas exploration and development will be estimated. Averaged widths of each disturbance type, such as roads, trails and seismic lines, have been determined from field surveys. Next, the area of existing roads and trails will be estimated by multiplying these widths by the corresponding mapped length of each type. To account for future roads, trails and landings, a five-per cent reduction will be applied to the timber harvesting land base currently covered with mature forests.
- **cultural heritage resources** - an archaeological site inventory was updated in 1999 based on information from the Ministry of Small Business, Tourism, and Culture. Known archaeological sites will be deducted from the timber harvesting land base by using the inventory information and an averaged area for the sites.

Operability
Classification of an area considered available for timber harvesting. Operability is determined using the terrain characteristics of the area as well as the quality and quantity of timber on the area.

Forest inventory and growth factors

- **forest inventory** - the current forest inventory has been updated to December 1999 to take into account recent harvesting and silviculture activities. As well, the upcoming analysis will use inventory adjustment factors developed from a new Vegetation Resources Inventory (VRI). As a result of the VRI, the tree heights, ages and volumes have been adjusted to improve inventory estimates.

  The principal coniferous tree species of commercial significance are lodgepole pine, white spruce, and subalpine fir. The major deciduous tree species are trembling aspen and cottonwood.
- **mixed-woods** – mixed-wood stands comprise a large proportion of the productive forest within the timber supply area. Currently there is limited information available on the growth and yield of these stands. In the timber supply analysis, the BC Forest Service's Variable Density Yield Projection model* will be used to estimate existing and future volumes for these stands.

Variable Density Yield Projection model
BC Forest Service computer program that generates natural stand yields.

Clearcut harvesting
A harvesting method whereby all trees that meet utilization standards are harvested. The harvested site is then regenerated to acceptable standards by appropriate means including planting and natural seeding.

Cutblock
A specific area, with defined boundaries, authorized for harvest.

Green-up
The time needed after harvesting for a stand of trees to reach a desired condition (usually a specific height) — to ensure maintenance of water quality, wildlife habitat, soil stability or aesthetics — before harvesting is permitted in adjacent areas.

Ungulate
Hoofed-herbivore, such as deer.

- **minimum harvestable ages** - the minimum harvestable age is the earliest age at which a forest stand is estimated to reach a merchantable size to be considered available for harvest. For the timber supply analysis, the ages are based on the time to achieve a minimum volume of 120 cubic metres per hectare and to meet regional priority harvest ages that range from 80 to 120 years.

Forest re-establishment factors

- **basic silviculture** - British Columbia laws require that harvested areas that are expected to produce timber in the future must be reforested with ecologically acceptable species within a specified time frame. The most common silvicultural practice is to harvest; then if necessary prepare the site for reforestation; reforest by planting a mix of species or by relying on natural regeneration; and finally, if necessary, control competing vegetation.

  In the Dawson Creek timber supply area, the most common silvicultural system involves clearcut* harvesting, with reforestation achieved predominantly by planting well-spaced trees of ecologically acceptable coniferous species or by natural regeneration of acceptable deciduous species. On less productive sites, a combination of planting and natural regeneration is used. In the timber supply analysis, it is assumed that all coniferous-leading areas are planted and reforested within four years after harvest. For deciduous-leading areas, it is assumed that reforestation is natural regeneration and adequate stocking will be achieved in two years following harvest.

Timber utilization factors

- **timber utilization** - estimates of merchantable volume will be based on the utilization of all trees (with some exceptions as noted below) which meet or exceed the following standards: a minimum 10-centimetre top diameter (inside the bark); a minimum 17.5-centimetre diameter measured at 1.3 metres above the ground, and a maximum 30-centimetre high stump.

  The exceptions include: lodgepole pine and deciduous stands have a minimum 12.5-centimetre diameter measured at 1.3 metres above the ground; small-diameter pine stands have a minimum 7.5-centimetre top diameter (inside the bark) and a minimum 9.0-centimetre diameter measured at 1.3 metres above the ground.

Infestations, devastations and salvage of timber

Each year, natural agents such as fire, wind, insects and disease (such as spruce beetle and *Tomentosus* root rot) damage portions of the forests in the Dawson Creek timber supply area. It is anticipated that some of the damaged timber will not be salvaged due to access and economic limitations or other environmental considerations. The annual unsalvaged volume is estimated to be 54,185 cubic metres.

Factors to be considered for purposes other than timber production

Forest management guidelines used to manage forest resources such as biodiversity, scenic values, wildlife habitat and water quality will be included in the timber supply analysis through the use of forest cover requirements, and volume and land-base reductions.

- **general forest cover requirements** - under current forest management practices, cutblocks* must achieve green-up* before adjacent areas are permitted to be harvested. The objective of this practice is to avoid over-concentration of harvesting in an area. To account for this practice in the analysis, no more than 33 per cent of the timber harvesting land base in the integrated resource management zone will be permitted to have forests less than three metres tall at any time. As well, forest cover requirements will be applied in the timber supply analysis to account for maintaining areas of old-growth forests for biodiversity.
- **visually sensitive areas** - the maintenance of scenic landscapes is a priority for recreation and tourism management. In the Dawson Creek timber supply area, visually sensitive areas are often located along major highways, primary access corridors and recreational waterways. Road construction and logging within these areas are planned and implemented to minimize visual impacts. In the analysis to reflect current management practices in visually sensitive areas, the amount of harvested areas (with trees less than five metres tall) will be limited to a maximum of between 5 and 20 per cent at any time.
- **recreation areas** – a recreation features inventory was completed in 1993. Recreation features that are classified as very sensitive will not contribute to the timber harvesting land base. In addition, 20 per cent of areas classified as sensitive and with a high or very high recreation significance are considered unavailable for timber harvesting.
- **riparian habitat** - to account for riparian reserves and management areas along waterways and around lakes, a percentage of the timber harvesting land base will be considered unavailable for timber harvesting.
- **sensitive wildlife habitat zone**- ungulate* winter range and wildlife habitat-burn areas that occur outside of riparian reserves represent the sensitive wildlife habitat zone. In this zone, 90 per cent of the area will not contribute to timber supply. There is some overlap of the sensitive wildlife habitat zone with riparian reserves, wildlife tree patches, and the caribou habitat zone, and adjustments will be made to ensure there that forest cover constraints are not additive.
- **caribou habitat zone** – low elevation caribou habitat is managed to enhance or maintain forest conditions for terrestrial lichen growth and to reduce fragmentation. In these areas, a minimum of 44 per cent of the forested area must be retained in mature plus old-seral* condition, of which at least 11 per cent must be old-seral forest. As well, a maximum of 33 per cent of the area can have forests less than 3 metres tall at any time.
- **grizzly bear management zone** – grizzly bear habitat will be accounted for by applying the intermediate biodiversity emphasis requirements to this zone as specified in the *Landscape Unit Planning Guide*. As well, a maximum of 33 per cent of the area can have forests less than 3 metres tall at any time.
- **biological diversity** - the *Forest Practices Code* requires that biodiversity be managed at both the stand and landscape level.

  Leaving wildlife trees* and tree patches to provide stand-level biodiversity is current practice in the Dawson Creek timber supply area. Generally, coarse woody debris* objectives are met by the contributions of non-merchantable timber left on the ground after harvest. The timber supply analysis will apply wildlife tree retention requirements described in the *Landscape Unit Planning Guide* to account for stand-level biodiversity within the timber harvesting land base.

Seral stages
Sequential stages in the development of plant communities that successively occupy a site and replace each other over time.

Wildlife tree
A standing live or dead tree with special characteristics that provide valuable habitat for conservation or enhancement of wildlife.

Coarse woody debris
Logs and stumps that provide habitat for plants, animals and insects, and a source of nutrients for soil development.

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Landscape unit
A planning area based on topographic or geographic features, that is appropriately sized (up to 100 000 hectares), and designed for application of landscape-level biodiversity objectives.

Sensitivity analysis
A process that examines how uncertainty in data and management assumptions affect timber supply.

Natural disturbance type (NDT)
An area that is characterized by a natural disturbance regime, such as wildfires, which affects the natural distribution of seral stages. For example areas with less stand-initiating disturbance have more older forests, and generally a greater abundance of species.

Person-year(s)
One person working the equivalent of one full year, defined as at least 180 days of work. If someone works full-time for 90 days, he or she accounts for 0.5 person years.

Management of landscape-level biodiversity will be accounted for in the timber supply analysis by applying averaged seral stage constraints to each draft landscape unit* and natural disturbance type*. This approach is being taken because at this time landscape units and biodiversity objectives are still in draft form and have not been formally established.

As part of the timber supply analysis, sensitivity analyses* will be undertaken to examine the potential impacts on timber supply of applying the draft biodiversity emphasis objectives developed for the Dawson Creek timber supply area.

Implications of alternative rates of harvesting

- **alternative rates of harvesting** - many alternative harvest forecasts can be produced for a given set of forest conditions and management assumptions. Each alternative usually represents a trade-off between the harvest level in the short term and the subsequent rate of decline to the long-term harvest level. For the projected base case forecast*, the initial harvest forecast will be based on trying to achieve the current rate of harvest in the short term without compromising the long-term harvest level, and if necessary, allowing for a gradual and managed transition to a lower harvest level. The implications of alternative short-term rates of harvest will be examined in the analysis.
- **implications related to community dependence** - the impact of timber supply adjustments on local communities and the province is an important consideration in the timber supply review. The 1996 *Dawson Creek Timber Supply Area Socio-Economic Analysis* reported that provincially, harvesting, silviculture and processing activities associated with the Dawson Creek timber supply area supported about 629 person-years* of direct employment, and approximately 947 person-years of indirect and induced employment. Local residents account for approximately 41 per cent of this employment.

The socio-economic section of the upcoming timber supply analysis report will review the role of the forest sector in the Dawson Creek timber supply area. To provide this update, current information on employment and fibre flows will be gathered from licensees, processing facilities, the Forest Service and stakeholders. Indirect and other related employment at both the local and provincial levels will also be estimated using employment multipliers provided by the Ministry of Finance and Corporate Relations.

To examine the implications of alternative rates of harvest, employment co-efficients, reported in person-years per 1,000 cubic metres, will be developed and used to estimate changes to employment levels now and in the future from any potential harvest level changes.

Timber processing facilities

The socio-economic analysis will examine the implications of potential changes in the timber supply for the area's timber processing facilities. Within the timber supply area, there are two large lumber mills, two smaller mills, an oriented strandboard (OSB) mill, and a log-home building facility. In 1999, these facilities processed a total of approximately 1.9 million cubic metres of wood. In addition there is a local pulp mill that processed just over 100,000 bone-dry units of wood chips in the same year. In total, these mills support about 800 employees.

The local timber processing facilities not only rely on the timber supply area for wood, but also on the tree farm licence areas, other timber supply areas, private land and out-of-province sources.

Economic and social objectives of the Crown

In a letter and a memo to the chief forester, the minister of forests has expressed the Crown's economic and social objectives for the province. The harvest flow objectives to be used in the timber supply analysis (see previous section, "*Alternative rates of harvesting*") are consistent with the minister's stated objectives.

In addition, economic and social objectives for the area and the general region will be derived from public input.

Your input is needed

Establishing the allowable annual cut is an important decision that requires well-informed and thoughtful public input. Feedback is welcomed on any aspect of this *Information Report*, the *Data Package Appendix* and other topics related to the timber supply in the Dawson Creek timber supply area. The response form at the end of this document will assist you in preparing your comments. As well, Forest Service staff would be pleased to discuss questions or concerns that may help you prepare your response.

Please mail the completed response form and your comments to the Forest Service district manager located at the address below. Your comments will be accepted until October 12, 2000.

After receiving public input, the Forest Service will finalize the data and management assumptions that will be applied in this timber supply analysis. The timber supply analysis will be completed and available for review by spring of 2001. You may also wish to participate in the second public review period, which will follow the release of the *Dawson Creek Timber Supply Area Analysis Report*.

Following the second public review period, the chief forester will examine all the information available in order to review the timber supply for the Dawson Creek timber supply area. The chief forester will then establish the allowable annual cut based on his consideration of the factors as required under Section 8 of the *Forest Act*.

You may identify yourself on your response if you wish. If you do, you are reminded that responses will be subject to the *Freedom of Information and Protection of Privacy Act* and may be made public. If copies of the responses are requested, personal identifiers will be removed before the responses are released.

For more information contact and/or mail your comments to:

District Manager
Dawson Creek Forest District
9000 17th Street
Dawson Creek, B.C.,
V1G 4A4

Phone: (250) 784-1200
Fax: (250) 784-2356

Regional Manager
Prince George Forest Region
1011 Fourth Avenue
Prince George, B.C.
V2L 3H9

Phone: (250) 565-6100
Fax: (250) 565-6396

or electronically mail to:
Winn.HaysByl@gems4.gov.bc.ca

Timber Supply Review

in the Dawson Creek TSA

Base case forecast
The timber supply forecast which illustrates the effect of current forest management practices on the timber supply using the best available information, and which forms the reference point for sensitivity analysis.

Dawson Creek Timber Supply Area
Timber Supply Review

Information Report Response Form

The *Forest Act* requires the chief forester to consider the following factors to determine the allowable annual cut for timber supply areas and tree farm licence areas in the province, as follows:

- the rate of timber production that can be sustained from the area;
- the short- and long-term implications to the province of alternative rates of timber harvesting from the area;
- the nature, production capabilities and timber requirements of established and proposed timber processing facilities;
- the economic and social objectives of the Crown for the area, the general region, and the province, as expressed by the minister of forests, and;
- abnormal insect or disease infestations and major salvage programs planned for the area.

We welcome your review to ensure the best available information is considered for the Dawson Creek timber supply area. Please provide your comments on this form, or in another format. Input will be accepted until October 12, 2000.

A. Economic and social objectives

Please use the space below to provide your comments regarding the economic and social information contained in this report or other information that you believe should be considered in completing the social and economic analysis for the Dawson Creek timber supply area.

B. Reviewing the draft data and management assumptions

Please use the space below to provide your comments regarding the draft data and management assumptions contained in this report or other information that you believe should be considered in the timber supply analysis for the Dawson Creek timber supply area.

Name (optional):_____

Address (optional):_____

Mail or fax your comments to:

District Manager
Dawson Creek Forest District
9000 17th Street
Dawson Creek, B.C.,
V1G 4A4

Phone: (250) 784-1200
Fax: (250) 784-2356

or electronically mail to:
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Regional Manager
Prince George Forest Region
1011 Fourth Avenue
Prince George, B.C.
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Phone: (250) 565-6100
Fax: (250) 565-6396

APPENDIX A

Data Package
Description of Data Inputs and Management Assumptions

This appendix is available upon request from the Ministry of Forests.

Offices are located at:

District Manager
Dawson Creek Forest District
9000 17th Street
Dawson Creek, B.C.,
V1G 4A4

Phone: (250) 784-1200
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Dawson Creek Timber Supply Area
Timber Supply Review

Data Package

September 2000

Terry Dyer

District Manager
Dawson Creek Forest District

G. Townsend

Director
Timber Supply Branch

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1. Introduction

This data package summarizes the basic information and assumptions required for the Dawson Creek Timber Supply Area (TSA) timber supply analysis.

The completed data package contains those inputs that represent current performance for the TSA. For the purpose of the timber supply review, "current performance" can be defined by:

- the current forest management regime — the productive forest land available for timber harvesting, the silviculture treatments, the harvesting systems and the integrated resource management guidelines used in the area;
- the standards used to approve or reject forest development plans;
- fully implemented land-use plans;
- land-use decisions approved by Cabinet;
- approved higher level plans under the *Forest Practices Code*; and,
- other approved B.C. Forest Service (BCFS) and joint agency forest management practices and policies.

The primary purpose of the timber supply review program is to model "what is" not "what if". Changes in forest management objectives and data, when and if they occur, will be captured in future timber supply analyses.

Each section of this data package includes:

1) A short explanation of the data required;
2) A data table or lists of modeling assumptions;
3) A description of data sources and other comments.

The information in this data package represents the best available knowledge at the time of publication, but is subject to change. A public review period has been established to allow submission of comments and concerns about the data package to the Ministry of Forests. Submissions and new information made available prior to the analysis may lead to changes in the data listed in this package. Until the timber harvesting land base is determined, it is not possible to finalize the values shown in some of the tables in this document. Where the final value is not yet available, the applicable columns are shaded grey. In addition, should any major changes in management practices occur during the next few months, the timber supply analysis will attempt to capture them. The final timber supply analysis report will include a technical appendix that highlights any changes made to this data package.

2. Current Forest Management Considerations and Issues

2.1 Base case management assumptions

The assumptions described in this section reflect current performance with respect to the status of forest land, forest management practices and knowledge of timber growth and yield. The harvest forecast developed from these assumptions is termed the base case harvest forecast and is used as a reference when examining the effects of uncertainties. Section 7, "Sensitivity Analyses," identifies areas of uncertainty in the data and assumptions and outlines intended sensitivity analyses.

2.2 Statement of major forest management considerations and issues

The following table lists major forest management issues and considerations. Where possible, the issues will be assessed directly in the timber supply analysis. If the issue does not fall within the definition of current management as described in Section 1, the related timber supply impacts will be assessed in a sensitivity analysis. There may be significant uncertainties in defining some current management issues. In such cases, sensitivity analysis can assist in assessing the potential timber supply implications and assigning degrees of risk to timber supply during the allowable annual cut determination.

Table 1. Major forest management considerations

Consideration/issue	Description
Dawson Creek Land and Resource Management Plan (LRMP)	The LRMP was approved by Cabinet in March 1999; currently, no portions have been declared as an approved higher level plan. Currently implemented forest practices designed to meet the objectives of the LRMP will be represented in the base case.
Proposed protected areas	An Order-in–Council (OIC) is required before approved protected areas can be considered permanently unavailable for timber harvesting. For the analysis, only officially designated protected areas will be excluded from the timber harvesting land base. Sensitivity analyses will examine the impacts of excluding proposed protected areas identified in the LRMP.
Small diameter pine stands	The current AAC includes a 100 000 cubic metre per year partition for small diameter pine (height class 2) stands The timber supply analysis will examine the contribution of these stands to timber supply.
Landscape-level biodiversity	Draft landscape unit (LU) boundaries and draft biodiversity emphasis objectives (BEO) have been identified. In the analysis forest cover requirements reflecting a weighted biodiversity emphasis option consistent with current provincial policy (45% lower, 45% intermediate, 10% higher) will be applied to each draft LU. A sensitivity analysis will examine the impact of applying draft BEOs.
Stand-level biodiversity	Wildlife tree requirements described in the *Landscape Unit Planning Guide* will be included in the base case.
Site productivity	Provincial studies known as the Old Growth Site Index (OGSI) project suggest that site productivity may be underestimated for regenerating stands. Current estimates for complex stands (e.g., mixedwoods) are also known to be unreliable. Sensitivity analysis will apply available site index adjustments to regenerating stands.
Physical operability	Terrain and surficial geology data are used to define physical operability across the TSA. The resolution of the resulting physical operability information is substantially greater than that used in the previous (1994) timber supply analysis.

(continued)

Table 1. Major forest management considerations (concluded)

Consideration/issue	Description
Mixedwood management	Mixedwood stands comprise a large proportion of the productive forest within the Dawson Creek TSA. These stands may contribute to the coniferous or the deciduous harvest depending on the species composition. Limited information on the dynamics and growth and yield of mixedwood stands is currently available. In the base case, yield curves generated using the variable density yield projection (VDYP) growth and yield model will be applied to all existing unmanaged stands and to regenerating deciduous-leading mixedwood stands; yield curves derived from the Table Interpolation Program for Stand Yield (TIPSY) will be applied to regenerating conifer leading mixedwood stands. Sensitivity analysis will incorporate yield curves generated using VDYP to examine strategies and objectives for boreal mixedwood stands
Caribou management	Low elevation caribou populations are known to winter in pine stands prevalent on the Kiskatinaw Plateau in the eastern portion of the TSA. Forest cover requirements will be applied to a caribou management zone in the analysis to represent management objectives for low elevation caribou.
Grizzly bear management	The TSA includes important habitat for grizzly bear. Early seral forest cover requirements will be represented in the base case to simulate management objectives for priority grizzly bear habitat.
Vegetation resources inventory (VRI)	Analysis of the VRI for the Dawson Creek TSA was completed in May 2000. Adjustment factors for height, age and volume were developed and will be incorporated as base case information into the timber supply analysis.
First Nations/treaty issues	First Nations bands are currently reviewing the Twin Sisters Special Management Committee recommendations to develop management guidelines acceptable to First Nations, industry, and government. Should guidelines that potentially affect timber supply in the Dawson Creek TSA be developed, they may be explored through sensitivity analysis.
Known archaeological sites	Known archaeological site information recently provided from the Ministry of Small Business, Tourism and Culture will be used in the analysis. In TSR I, archaeological sites were assumed to be accommodated by riparian reductions.
Oil and gas exploration and development	The Dawson Creek TSA contains important energy resources including oil and natural gas. Reductions to the productive forest land base associated with exploration and development will be considered in the analysis as part of roads, trails, and landings (RTLs).
Deciduous decay	There is significant uncertainty in current decay estimates for deciduous species. Local data have been collected and will be used to develop preliminary loss factors more specific to the TSA. A sensitivity analysis may be conducted to explore the impact of this uncertainty on timber supply.

3. Inventories

3.1 Background information

Inventories that will be used in determining the timber harvesting land base and representing current forest management activities are listed in Table 2. Comments on how the information is being used in forest management are also provided.

Table 2. Inventory information

Data	Inventory source	Vintage	Update	Input scale
Forest cover	Ministry of Forests (MoF)	1970-1988	1999	1:20 000
Forest development plan cutblocks — non-standard overlay for FC1 update	Licensee & SBFEP FDPs	1999	—	1:20 000
Known archaeological sites	Archaeology Branch, MoSBTC[1]	1995	1999	1:50 000
Riparian — stream classification	MELP – TRIM II	1996	—	1:20 000
Riparian — wetland classification	MoF – FC1/FIP	1970-1988	—	1:20 000
Riparian — lake classification	MoF – FC1/FIP	1970-1988	—	1:20 000
Visual landscape	MoF	1991	1996 1999/00	1:50 000
Recreation features	MoF	1992/93	1999/00	1:50 000
Grazing tenures — non-standard overlay	MoF – Atlas/ district range tenure maps	1970-1988	1998	1:20 000
Caribou management zone — non-standard overlay	MoF LRMP	1994	1998	1:250 000
Ungulate winter range (UWR) — non-standard overlay	Northeast Coal/ MELP	1999	—	1:250 000
Grizzly bear management zone — non-standard overlay	MoF	1999	—	1:250 000
Wildlife burns — non-standard overlay	MELP	1999	—	1:50 000
Base ownership	MoF – FC1/FIP	1970-1988	—	1:20 000
LRMP resource management zone (RMZ) boundaries	MoF LRMP	1994	1998	1:20 000 1:250 000
Goal 1 and 2 Protected Areas			1999	1:20 000
Woodlot tenure — non-standard overlay	MoF	1999	—	1:20 000
Agriculture land reserve	MAFF[1]	1990	1999	1:50,000
Draft landscape unit boundaries	MoF	1996	1999	1:20 000
Planning cell boundaries	MoF	1999	—	1:20 000
District boundary	MoF	1992	1999	1:250 000

(continued)

3. Inventories

Table 2. Inventory information (concluded)

Data	Inventory source	Vintage	Update	Input scale
Pulpwood agreement 7, 10, 13 boundaries	MoF LRMP	1992	1998	1:250 000
Tree farm licence (TFL) 48 boundaries	MoF	1992	1999	1:20 000
Roads, trails and landings	MoF – FC1/FIP MELP TRIM II	1970-1988 1996	— 1999	1:20 000
Utilities	MoF – FC1/FIP MELP TRIM II	1970-1988 1996	— 1999	1:20 000
Oil and gas well sites	MoF – FC1/FIP MELP TRIM II	1970-1988 1996	— 1999	1:20 000
Biogeoclimatic ecosystem classification	MoF	1998	Ver. 1.2	1:20 000
Physical operability:				
Surficial geology 93I block	MEM[1]	1959	1999	1:50 000
Surficial geology 93P & 94A blocks	GSC[1]	1970	1999	1:250 000
Lacustrine inventory 930 & 94B blocks	MoF	1998	1999	1:250 000
Slope	MELP – TRIM II	1996	1999	1:20 000

(1) MELP – Ministry of Environment, Lands and Parks
MoSBTC – Ministry of Small Business, Tourism and Culture
MAAF – Ministry of Agriculture, Fisheries and Food
MEM – Ministry of Energy and Mines
GSC - Geological Survey of Canada

Data source and comments:

Forest cover

A 1994 forest inventory audit of the Dawson TSA supports ongoing concerns around the reliability of the inventory and re-inventories (i.e., classification, and issues relating to forest succession, land base, and volume estimates). The forest cover database was updated for timber harvesting activities occurring from 1994 to 1999 within the TSA (refer to Forest Development Plan Cutblocks). Labels have been projected to 1998 and 1999.

Known archaeological sites

Known archaeological sites are represented as point features across the Dawson Creek Forest District. Data were provided in an Arc/Info coverage at 1:250,000 by the Ministry of Small Business, Tourism and Culture, and include paleontological, prehistoric and historic features.

Forest development plan cutblocks

A non-standard cutblock inventory was generated from a compilation of major licensees' Forest Development Plans. This inventory was used to update the forest cover within the Dawson Creek Forest District to represent cutblock disturbance up to December, 1999. The coverage includes cutblocks that have been completely harvested, or cutblocks where harvesting is in progress, since the most recent forest cover update.

3. Inventories

Riparian areas

Three inventories are used to represent riparian features across the Dawson Creek Forest TSA. Streams and rivers are represented using TRIM II data at 1:20,000 while lakes and wetlands are represented using forest cover at 1:20,000. Reserve zones for each feature have been buffered according to criteria described in the *Riparian Management Area Guidebook*, and subsequently merged into one coverage to facilitate analysis.

Visual landscape

The visual landscape inventory represents visual quality objectives across the Dawson Creek Forest District at 1:50,000. The updated inventory reflects revisions to master visual quality objectives along the Peace River corridor where visual landscape inventories have identified visually sensitive areas. The inventory has been reformatted to Resource Inventory Committee (RIC) standards and represents known VQOs.

Recreation features

The recreation features inventory represents recreation features across the Dawson Creek Forest District at 1:50,000. The updated inventory reflects electronic reformatting of the original inventory to RIC standards.

Grazing tenures

A non-standard inventory was generated at 1:20,000 to represent Crown grazing permit areas and Crown grazing leases across the Dawson Creek Forest District. The tenure boundaries are based on forest cover and atlas information, and are current to October 1999.

Caribou management zone

Winter range for the northern ecotype caribou within the *Dawson Creek Land and Resource Management Plan* (LRMP) is represented as a non-standard inventory at 1:250,000. The caribou zone was delineated using various sources of information including Northeast Coal studies and the Ministry of Environment, Lands and Parks (MELP) surveys information.

Ungulate winter range (UWR)

A non-standard inventory of winter range for all species of ungulate within the forest district is represented at 1:250,000. This inventory is based on various sources of information including Northeast Coal studies and MELP surveys.

Grizzly bear management zone

The grizzly bear zone is represented within the Dawson Creek Forest District as a non-standard inventory at 1:250,000. The zone occurs within natural disturbance types (NDT) 1 and 2, in mountainous terrain along the western portion of the district. It is also referenced as habitat zone A within the Dawson Creek Forest District's *Pest Management Plan*. The inventory is based on forest cover and TRIM II data.

Wildlife burns

The non-standard wildlife burn inventory represents the MELP's recent compilation of wildlife burn sites within the Dawson Creek Forest District, mapped at 1:50,000. The inventory is based on forest cover and TRIM II data.

Base ownership

Base ownership is represented within the Dawson Creek Forest District at 1:20,000. Ownership is based on forest cover and atlas information.

3. Inventories

Land and resource management plan (LRMP) resource management zone boundaries

Resource management zones within the approved Dawson Creek LRMP are represented at 1:250,000. Zone boundaries are based on TRIM II water features, heights of land, and roads. Protected areas and community pastures are identified as separate resource management zones within this inventory. In October 1999, minor revisions were made to the proposed protected area boundaries to reflect current ownership status and to facilitate order-in-council designation of the protected areas. Order-in-council designations are anticipated in 2000, and may vary slightly from this coverage.

Woodlots

Woodlot tenures within the Dawson Creek Forest District are represented at 1:20,000. Woodlots are usually accounted for in the ownership layer, however the ownership data is known to be unreliable. This non-standard inventory is based on forest cover and district woodlot tenure information.

Agriculture land reserve

Agriculture land reserve within the Dawson Creek Forest District was digitized by the Agriculture Land Commission in 1990 at 1:50,000, and subsequently revised using TRIM I water features, heights of land, and roads, and cadastral data (CDMS) at 1:20,000. The inventory is current to January 31, 1999.

Draft landscape unit boundaries

Draft landscape unit boundaries within the Dawson Creek Forest District were delineated using TRIM I and TRIM II water features, heights of land, and roads, and also forest cover. Boundaries have been mapped at 1:20,000. Some draft landscape units include land within Tree Farm Licence (TFL) 48 and land not administered by the Ministry of Forests.

Planning cell boundaries

Planning cell boundaries within the Dawson Creek Forest District are based on TRIM I and TRIM II water features, heights of land, and roads, and also forest cover. Original planning cell boundaries and planning cell numbers have been revised for consistency with draft landscape unit boundaries and numbers. Planning cells are not shared between landscape units. Some planning cells include land within TFL 48 and land not administered by the Ministry of Forests.

Forest district boundary

The district boundary represents recent revisions based on the *Watershed Atlas*. This coverage is recognized as the official Dawson Creek Forest District boundary.

Pulpwood agreement boundaries

Pulpwood agreement (PA) boundaries delineate areas in two deciduous pulpwood agreements and one coniferous pulpwood agreement within the Dawson Creek Forest District. The coverage was provided by the Ministry of Forests' Resource Tenures and Engineering Branch, and is mapped at 1:250,000.

TFL 48 boundaries

TFL 48 boundaries include five main TFL blocks within the Dawson Creek Forest District. The coverage was provided by the Ministry of Forests' Resource Tenures and Engineering Branch, and reflects the recent addition of the Rice Properties.

Roads, trails and landings

The roads, trails and landings inventory represents unclassified access-related disturbances at 1:20,000 within the Dawson Creek Forest District, current to December 1999. Linear disturbances, including seismic lines, are buffered according to criteria specified in Table 9a. This inventory is based on forest cover and TRIM II information.

3. Inventories

Utilities

The utilities inventory represents linear disturbances for powerlines, pipelines and railways at 1:20,000 within the Dawson Creek Forest District, current to December 1999. Linear disturbances are buffered according to criteria specified in Table 9. This inventory is based on forest cover and TRIM II information.

Oil and gas well sites

This inventory represents well sites as point features at 1:20,000 within the Dawson Creek TSA, current to December 1999. Well sites are buffered according to criteria specified in Table 9. This inventory is based on forest cover and TRIM II information.

Biogeoclimatic ecosystem classification (BEC)

The biogeoclimatic ecosystem classification (Version 1.2) is represented to the variant level within the Dawson Creek Forest District at 1:20,000.

Physical operability

Physical operability represents a compilation of terrain and slope data for the Dawson Creek Forest District. It is based on four principal data sources. For forest cover mapsheets within 93I letter block, 1959 surficial geology data from the Ministry of Energy and Mines were digitized at 1:50,000. For mapsheets within 93P and 94A letter blocks, 1970 surficial geology data from the Geologic Survey of Canada were digitized at 1:250,000. For mapsheets within 93O and 94B letter blocks, 1998 aerial photo-interpreted parent material classifications from the Ministry of Forests (Prince George Regional Office) were digitized at 1:250,000. Slope data from TRIM II are represented at 1:20,000 using slope classes that reflect the current technological capabilities of harvesting systems used in the district (Table 6).

4. Division of the Area into Management Zones

4.1 Management zones, groups and multiple objectives

Management zones represent areas with distinct management emphasis. For example, a zone may be based on a harvesting system, silvicultural system, visual quality objective, or wildlife consideration. Sometimes one area of forest is subject to more than one management objective. For simulation modelling, a "group" function enables application of overlapping constraints. The timber supply analyst and operational staff will decide whether to put an objective into a group or a mutually exclusive management zone following data assessment. In addition, the non-contributing forest (land considered unavailable for timber harvesting) will be included for consideration in achieving forest cover objectives.

Further information on the forest cover requirements to be applied to these areas can be found in Section 6.4, "Integrated resource management".

Table 3. Objectives to be tracked

Objectives	Inventory definition	Function
Landscape-level biodiversity	Standard mapped layer (FIP file); BEC inventory	Application of biodiversity targets at the landscape unit/emphasis/BEC variant level. Applied to all Crown forest.
General integrated resource management (IRM)	Operable area not subject to specific non-timber management objective	Application of adjacency criteria by landscape unit. Applied to timber harvesting land base.
Caribou management zone	Non-standard mapped layer	Forest cover requirements associated with low elevation caribou habitat will be applied to the caribou management zone (specifically greater than 44% of the Crown forested land base in mature + old seral classes of which at least 11% represents old seral classes).
Grizzly bear management zone	Non-standard mapped layer	Forest cover constraints associated with priority grizzly bear habitat will be examined in the base case using the early seral retention per cent for an intermediate biodiversity emphasis in natural disturbance types 1 and 2 (*Biodiversity Guidebook*).
Visual landscape objectives	Standard mapped layer (visual sensitivity classes include: preservation, retention, partial retention, modification)	TSA cutblock adjacency requirements; and provincial guidelines for factoring visual resources into timber supply analysis

4. Division of the Area into Management Zones

4.2 Analysis units

An analysis unit represents a combination of stands dominated by specific tree species with specified timber growing capability — as indicated by the inventory type group and site index in the forest inventory file. Each analysis unit is assigned its own timber volume projections (yield tables) for existing and future stands. The following table identifies the draft analysis units. After deriving the timber harvesting land base, the timber supply analyst will review the area found in specific analysis units and the similarities between yield tables to determine the final analysis unit definitions.

Table 4. Definition of analysis units

Analysis unit #	Stand description stand type	General species composition	Additional details
Pure conifer			
1	Spruce	spruce total % > 80	black spruce % < 50 %
2	Balsam	balsam total % > 80	—
3	Pine > 19.4 m height	pine total % > 80	—
4	Pine ≤ 19.4 m height	pine total % > 80	—
Pure deciduous			
5	Aspen	aspen % > 80	—
6	Cottonwood	cottonwood % > 80	—
Conifer leading			
7	spruce leading	spruce total % > 50 and ≤ 80	black spruce % < 50 total deciduous % < 20
8	pine leading > 19.4 m height	pine total % > 50 and ≤ 80	total deciduous % < 20
9	pine leading ≤ 19.4 m height	pine total % > 50 and ≤ 80	total deciduous % < 20
10	balsam leading	balsam total % > 50 and ≤ 80	total deciduous % < 20
Deciduous leading			
11	aspen leading	aspen total % > 50 and ≤ 80	total conifer % < 20
12	cottonwood leading	cottonwood total % > 50 and ≤ 80	total conifer % < 20
Conifer mixedwood			
13	spruce leading	spruce total % > 50 and ≤ 80	black spruce % < 50 total deciduous % > 20 and ≤ 50
14	pine leading	pine total % > 50 and ≤ 80	total deciduous % > 20 and ≤ 50
15	any conifer and deciduous species	conifer total % > deciduous total %	total deciduous % > 20 and ≤ 50
Deciduous mixedwood			
16	aspen leading	aspen total % > 50 and ≤ 80	total conifer % > 20 and ≤ 50
17	cottonwood leading	cottonwood total % > 50 and ≤ 80	total conifer % > 20 and ≤ 50
18	any deciduous and conifer species	deciduous total % > conifer total %	total conifer % > 20 and ≤ 50

4. Division of the Area into Management Zones

Data source and comments:

Analysis units were derived from FIP data. The units are based on the species composition of potentially all six inventoried species rather than the assigned inventory type group (ITG) alone. Greater detail is required for assigning a species combination to a respective unit, particularly for mixedwood units 11 through 18, than is afforded by using ITGs alone. Use of ITGs alone may result in erroneous assignment of some mixedwood stands to either conifer-leading or deciduous-leading analysis units.

Timber supply will be tracked separately for coniferous-leading and deciduous-leading stands. Mixedwood stands will contribute to their respective leading timber type (either coniferous or deciduous).

5. Timber Harvesting Land Base Definition

5.1 Identification of the timber harvesting land base

This section outlines the steps used to identify the timber harvesting land base (the productive forest expected to support timber harvesting) within the timber supply area. Land may be unavailable for timber harvesting for three principle reasons:

- it is not administered by the B.C. Forest Service for timber supply (e.g., private land, parks, etc.).
- it is not suitable for timber production.
- it is required entirely for meeting other values.

Land that is currently unavailable for harvesting or not producing timber may also be added to the timber harvesting land base:

- by management activities which improve productivity or operability (e.g., the stocking of land currently classified as non-commercial brush).
- by the acquisition of productive forest land (e.g., timber license reversions).

After all areas that do not contribute to the timber harvesting land base have been identified, any additional lands are added to the land base. The resulting productive forest land base is defined as the "current timber harvesting land base" for the Dawson Creek TSA.

5.2 Details on land base classification

5.2.1 Land not administered by the B.C.F.S. for timber supply purposes

Ownership codes within the forest inventory file identify land that can potentially contribute to timber supply. All areas not designated as ownership code 62C (Crown Forest Management Unit) or 69C (Crown Miscellaneous Reserves) will be excluded from the timber harvesting land base.

Crown Grazing Leases (ownership code 90) are considered to contribute to the timber harvesting land base, but will not be addressed through ownership code. Information within the FIP database relating to crown grazing leases is known to be unreliable, therefore current information will be made available through a non-standard grazing lease and grazing permit overlay.

Community pastures are also considered to contribute to the timber harvesting land base. Normally, they are assigned an ownership code of 78, but they are not distinguished uniquely from the Crown forest management unit (62C) in the Dawson Creek FIP database. Community pastures are delineated in the resource management zone (RMZ) inventory as enhanced–grazing reserves. The six community pastures are Groundbirch, Sunset, Farrell Creek, Bear Mountain, One Island, and Wartenbe grazing reserves.

All areas identified as code 61C — Use, Recreation and Enjoyment of the Public (UREP) are unavailable for timber harvesting.

Data source and comments:

The FC1 ownership layer will be used in the timber supply analysis with the realization that this information is at least six years out of date in some cases. An attempt was made to gain access to the Crown lands ARC cadastral coverage that has been kept more up-to-date. After much investigation, and in consultation with Fort St. John Forest District staff and MELP staff, this approach was abandoned. The ARC cadastral format provides polygonal data, but no associated status data. The link between the spatial and the status data could only be made at excessive expense and time investment, neither of which were feasible options for this timber supply review (TSR).

5.2.2 Land classified as non-forest

Type identity 6 and 8 areas such as alpine, lakes, rocks, cultivated field, etc., are removed from the land base considered for timber supply.

5.2.3 Non-commercial cover

Type identity 5 represents areas occupied by non-commercial brush species. These areas are unlikely sites for timber production and unless site rehabilitation is planned (refer to Section 6.3.4), they are excluded from the area considered to contribute to timber supply.

5.2.4 Environmentally sensitive areas

Some forested lands are environmentally sensitive and/or significantly valuable for other resources. Many of these areas are typically identified and delineated during a forest inventory as environmentally sensitive areas (ESAs). Two ESA categories—highly and moderately sensitive—are recognized in the classification system. Harvesting opportunities may be reduced on areas classified as environmentally sensitive.

For the Dawson Creek TSA, formal ESA classifications will not be used. Instead, more recent information will be used to identify areas with sensitive soils, wildlife habitat and recreation features.

5. Timber Harvesting Land Base Definition

Table 5a describes how these sensitive areas will be accounted for in the analysis.

Table 5a. Description of environmentally sensitive areas

Resource category	Description	Reduction per cent (%)
Recreation	Refer to recreation features (Table 5b)	—
Wildlife habitat	Refer to ungulate winter range and wildlife burn overlays and riparian reserves	90
Sensitive soils	Refer to physical operability overlay (section 5.2.5)	—

Data source and comments:

Recreation

- No specific reductions will be made for Er areas. Management for recreation values across the Dawson Creek TSA will be addressed through the recreation features inventory as described in Table 5b.

Table 5b. Recreation features — area reduction factors

Feature significance	Feature significance code	Per cent area reduction Recreation management class	
		0 very sensitive	1 sensitive
Very high	A	100	20
High	B	100	20
Moderate	C	100	0

The following recreation management classes describe the sensitivity of recreation inventory polygons to disturbance:

0	Very sensitive	Outstanding recreational, educational, scientific or heritage values
1	Sensitive	Requires special management practices
2	Not sensitive	Normal forest management practices

The recreation features inventory was completed in 1992/3 using procedures described in the *Ministry of Forests Recreation Manual*. A combination of local knowledge, public input, field reconnaissance, air photo interpretation, topographic maps, and other resource agency information was researched to complete the inventory.

Sensitive soils

- Sensitive soils are identified and removed through the determination of physical operability. The soils and slope information used to determine physical operability are more current and reliable than ESAs identified in the ESA inventory.

Wildlife habitat

- Areas of sensitive wildlife habitat will be determined by overlaying the ungulate winter range, wildlife burn and riparian reserve coverages. A 90 percent reduction will be applied to ungulate winter range and wildlife burn areas that occur outside of riparian reserves. In addition to riparian reserves and the 90 percent reduction, wildlife habitat will also be reflected in wildlife tree retention requirements, the caribou habitat zone, and through general forest cover constraints.

5.2.5 Inoperable areas

Operability and inoperability codes are generally used to describe the presence or absence of physical barriers or limitations to harvesting, logging methods (e.g., cable), and the merchantability of stands.

Physical operability is spatially represented using slope classes and soil/parent material types listed below in Table 6.

Table 6. Description of physical operability

Operability type	Slope (%)	Parent material	Operability code
Conventional (ground)	0-30	Lacustrine	A
Conventional (ground)	0-40	Moraine	A
Cable[a]	> 30-80	Lacustrine	C
Cable[a]	> 40-100	Moraine	C
Aerial[b]	> 100	Moraine	H
Inoperable	> 80	Lacustrine	I

(a) Cable includes mixed conventional/cable harvesting systems.

(b) Aerial includes mixed aerial/cable harvesting systems.

Data source and comments:

Classification of parent materials within the Dawson Creek TSA is based on the three sources of terrain data identified earlier in Table 2, under physical operability.

Earlier versions of physical operability have been updated by incorporating more detailed slope and soils information in association with current harvesting practices in the Dawson Creek TSA.

Slope classes are derived using the TRIM inventory and reflect harvest equipment capability and environmental suitability. Additionally, Workers Compensation Board slope limitations for ground-based systems have been incorporated. Soil/parent material types have been categorized according to their sensitivity to disturbance. Generally, fine-textured aeolian, alluvial/fluvial, and lacustrine parent materials are considered to be more sensitive soil types.

5.2.6 Sites with low timber growing potential

Sites may have low productivity either because of inherent site factors (e.g., nutrient availability, exposure, excessive moisture), or because they are not fully occupied by commercial tree species. These stands are not considered to be harvestable, and will be removed from the timber harvesting land base.

Table 7a lists the harvesting systems and the associated per cent reduction for mature stands in three stand volumes classes (see Table 7b for maturity ages). All inoperable stands are excluded from the timber harvesting land base.

Table 7a. Per cent area reductions for mature stands based on harvesting system and volume per hectare

Harvesting system	Percent area reduction volume (cubic metres per hectare)		
	< 120	120-200	> 200
Conventional	97	0	0
Cable[a]	100	100	0
Aerial[b]	100	100	0

(a) Cable includes mixed conventional/cable harvesting systems.

(b) Aerial includes mixed aerial/cable harvesting systems.

Table 7b lists the criteria for including immature stands in the timber harvesting land base. The criteria are listed by harvesting system, leading species and associated analysis units.

Table 7b. Inclusion criteria for immature stands by harvesting system

Harvesting system	Leading species	Analysis unit	Age at maturity (years)	Height at maturity (metres)	Stocking class
All	Spruce	1, 7, 13, 15	140	17.5	1, 2
All	Balsam	2, 10	140	17.5	1, 2
All	Pine	3, 8, 14	100	17.5	1, 3
Conventional	Small pine	4, 9	80	17.5	1, 3
Conventional	Aspen	5, 11, 16, 18	80	10.5	1, 2
Conventional	Cottonwood	6, 12, 17	80	10.5	1, 2

Data source and comments:

To determine stand merchantability for immature stands, site index criteria will be applied to immature stand ages projected to maturity.

Stands that represent a volume per hectare equal to or greater than 120 cubic metres per hectare at maturity are considered merchantable. Typically, unmerchantable stands lack sufficient standing volume per hectare to ensure harvesting costs outweigh development costs. On poor sites, these stands lack sufficient productivity to ensure silviculture obligations can be met without significant intervention, and/or they represent poor quality timber.

5.2.7 Problem forest types

Problem forest types (PFT) are stands that are physically operable and exceed low site criteria yet are not currently utilized or have marginal merchantability.

Table 8 lists the problem forest types that will be excluded from the from the timber harvesting land base.

Table 8. Problem forest types criteria

Leading species	Inventory type group	Analysis unit	Stocking class	Reduction (%)
Black spruce	21-26	1, 7, 13		100
Lodgepole pine (stocking class 4)	28-31	3, 4, 8, 9, 14	4	100
Cedar, hemlock, larch, fir	1-17, 33, 34	15		100
Alder, maple, birch	37, 38, 39, 40	18		100

Data source and comments:

The above stand types are typically not harvested in the TSA based on current practice.

5.2.8 Roads, trails and landings

Separate estimates are made to reflect the loss in productive forest land because of existing and future roads, trails and landings (RTLs). Existing RTL estimates are applied as reductions to the current productive forest land considered available for harvesting, and future RTL reductions are applied after stands are harvested for the first time.

All highways and larger municipal roads of a sufficient size to be mapped as polygons and classified as non-forest areas in the forest inventory file are removed from the timber harvesting land base as non-forest area, as discussed in Section 5.2.2, "Land classified as non-forest". All other RTLs are depicted as lines on forest cover maps, and have no associated polygons. The estimated widths of these features are described in Table 9. These criteria will be applied to the RTLs inventory to derive the area occupied by existing RTLs. To account for future RTLs, a five per cent deduction will be applied after stands are harvested for the first time.

5. Timber Harvesting Land Base Definition

Table 9. Classification of access features, Dawson Creek TSA

Disturbance feature	Disturbance width/area	Feature length (km)/	Area reduction (ha)	Comments
Logging/secondary roads	20 m			
Access roads	15 m			No reforestation (permanent roads) right-of-ways not planted
Power lines	20 m			
Pipe lines	18 m			
Secondary roads (Ministry of Transportation and Highways – MOTH)	25 m			
Seismic lines	7 m			
Trails	5 m			
Railway	20 m			
Landings	0.25 ha/ landing	-		
Well sites	1.44 ha/site	-		

Data source and comments:

Estimates for existing and future RTLs within the Dawson Creek TSA are detailed in a report entitled *Manual review of roads, trails, landings, seismic lines and utilities corridors in the Dawson Creek TSA* (Dawson Creek Forest District, December 1999). Sources of estimates for roads, trails and landings during the last timber supply review included ground-based surveys, information from silvicultural prescriptions, advice from district engineering staff, and regional estimates. For TSR II, additional sources of information have been used to develop estimates, including:

- Integrated Silviculture Information System (ISIS) / Major Licensee Silviculture Information System (MLSIS) records;
- Canfor's Forest Road Management System;
- A computer program (ODOMETER for Microstations and INVSPECTS for PCs) that can measure, by mapsheet, the length of roads.

5.2.9 Wildlife habitat reductions

In February 1999, the B.C. government announced the *Identified Wildlife Management Strategy*. The goals of the strategy are to manage important habitat of identified wildlife by establishing wildlife habitat areas and implementing general wildlife measures. To date, there are no wildlife habitat areas established in the Dawson Creek TSA. Refer to Section 6.4, "Integrated Resource Management" for forest cover requirements relating to wildlife habitat.

5.2.10 Cultural heritage resource reductions

Cultural heritage values include trapping areas, and sites of archaeological or traditional use. Known archaeological sites are provided in an inventory supplied by Archaeology Branch, Ministry of Small Business, Tourism and Culture. Table 10 provides a summary of cultural heritage resources identified within the Dawson Creek TSA. Traditional land use studies are ongoing. However, to date, there have been no traditional land use areas determined or delineated. Both First Nations bands (West Moberly First Nations and Saulteau First Nations) within the district have entered the treaty land entitlement claim process.

The Twin Sisters special management zone (TSSMZ) is currently being reviewed to develop management guidelines acceptable to tenure holders and First Nations. Co-ordinated access and road deactivation plans will be developed between forest licensees and oil and gas firms operating within the zone. Guidelines for silvicultural systems, old-growth management areas, and inoperable areas will need to be agreed upon by licensees and First Nations. A visual quality assessment is currently being undertaken by Canadian Forest Products Ltd.

Salvage, silviculture and road maintenance are currently permitted activities within the Twin Sisters SMZ. There are four cutblocks within the area that forest licensees plan to develop. Once agreement is reached, development will proceed. A long-term plan for the TSSMZ should be in place by 2003.

Table 10. Cultural heritage resources

Identifying inventory variables (location descriptors)	Excluded area (hectares)	Reason for exclusion
Known archaeological sites **Paleontological** **Prehistoric** (lithics, petroglyph, cairn, earthwork, mound, fire-broken rock, calcined bone, bone, hearth, land mammal, cache, rock shelter, cave, burial) **Historic** (industrial, farming, governmental, commercial, culturally modified tree, log cabin, depression/circular habitation, trail, human remains, cemetery, root cellar, fishing station, tipi, camp, refuse)	1.83 hectares / site	Known feature (FPC)

Data source and comments:

Known archaeological sites will be excluded on a polygon specific basis. The area to be excluded from the timber harvesting land base will be the product of the number of archaeological sites per polygon and the average site area (1.83 hectares). The area associated with sites occurring within riparian reserves will be excluded through the riparian reductions described in section 5.2.11 "Riparian reserves and management zones".

5.2.11 Riparian reserve and management zones

Table 11 summarizes stream, wetland and lake classifications, and the corresponding widths of riparian reserve and riparian management zones for the Dawson Creek TSA. Riparian reserve and riparian management zone widths are based on those specified for each feature class in the *Riparian Management Area Guidebook.*

Table 11. Riparian areas (streams, wetlands, and lakes)

	Riparian class	Average channel width (metres) or wetland/lake size (ha)	Reserve zone width (metres)	Management zone width (metres)	Total riparian management area (RMA) width (metres)
Streams					
	S1	≥ 100 m	0	100	100
	S1	> 20 and < 100 m	50	20	70
	S4	< 1.5 m	0	30	30
	S6	≤ 3 m	0	20	20
Wetlands					
	W1	> 1000 ha	0	0	0
	W1	> 5 ha	10	40	50
	W3	1-5 ha	0	30	30
	Unclassified	< 1 ha	0	0	0
Lakes					
	L1	> 1000 ha	0	0	0
	L1	< 1000 ha	10	0	10
	L3	1-5 ha	0	30	30

Data source and comments:

Stream classifications are based primarily on slope gradient with secondary emphasis on stream width using TRIM data. Due to difficulty in interpreting stream width, interpretations have been broadly classified into S1, S4, and S6 categories.

For the base case, only riparian reserve zones will be excluded from the timber harvesting land base since timber retention within the riparian management zone is not currently practiced within the Dawson Creek TSA. The yield implications of applying the average basal retention levels identified for riparian management zones in the *Riparian Management Area Guidebook* will be compiled to estimate the potential timber supply impact.

Wetland and lake classifications are based on feature area, and in the case of wetlands by forest cover type. Wetlands are defined as non-productive black spruce types. Wetland classifications include W1 and W3 classes and also unclassified wetlands, while lake classifications include L1 and L3 classes.

5. Timber Harvesting Land Base Definition

Wetland and lake reserve zones will be excluded from the timber harvesting land base while no retention will be applied to the associated management zones, consistent with current practice. Due to analysis complexity and time constraints, W5 classifications representing wetland complexes have been excluded from this coverage. Sensitivity analysis may be used to examine the uncertainty associated with wetland complexes.

5.2.12 Exclusion of specific, geographically defined areas

This section specifies the location and total area to be excluded from the timber harvesting land base to account for any area exclusions that are a part of current forest management, and not identified in previous sections. For example, the number of hectares of planning cell 0101 that are excluded to account for the designated (by Order-in-Council) Kakwa provincial park is not already accounted for on the inventory file. Another example would be areas of timber that are not accessible and thus not available for timber harvesting, (e.g., obstructed by hanging valleys).

While areas recognized in legislation or by Order-in-Council as not contributing to the timber harvesting land base may be excluded, areas which have been deferred from harvesting because they are contentious or are under study (e.g., planning deferrals, potential parks) are considered available for timber harvesting for the purposes of the timber supply review.

5. Timber Harvesting Land Base Definition

Table 12. Exclusion of specific, geographically defined areas

Planning cells	Forest exclusion %[a]	Reason for exclusion
101	100	Kakwa provincial park (Order-in-Council)
102	100	Development costs outweigh the value of available timber volumes[b]
201	100	
202	20	
214	100	
301	10	
403	100	
501	80	
1204	20	
2403	50	
2405	30	
2409	100	
2410	30	
All TSA planning cells	1	Exclusion for physical inoperability, additional to economic operability exclusions identified above

(a) Since these geographic exclusions have not been reviewed in detail with respect to their impact on the timber harvesting land base, the forest district will review and confirm these geographic exclusions once the timber harvesting land base has been defined.

(b) Based on current market conditions

Data source and comments:

Dawson Creek Forest District staff conducted a detailed review of the TSA to examine planning cells with high development costs and limited merchantable timber volume. In addition, to account for several areas that are known by district staff to be physically inaccessible for timber harvesting (i.e., hanging valleys, small isolated stands, etc.), a further 1% of the operable land base will be excluded.

6. Current Forest Management Assumptions

6.1 Harvesting

6.1.1 Utilization levels

Utilization levels define the maximum stump height, minimum top diameter (inside bark) and minimum diameter at breast height (dbh) by species and are used in the analysis to calculate merchantable volume.

Table 13. Utilization levels

Species	Analysis unit	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
Spruce	1, 7, 13, 15	17.5	30	10.0
Balsam	2, 10	17.5	30	10.0
Pine	3, 8, 14	12.5	30	10.0
Pine (height class 2)	4, 9	9.0	30	7.5
Aspen	5, 11, 16, 18	12.5	30	10.0
Cottonwood	6, 12, 17, 18	12.5	30	10.0

Data source and comments:

In the *Dawson Creek TSA Rationale for the Allowable Annual Cut (AAC) Determination* (December 30, 1996), the chief forester partitioned the AAC to provide an annual harvest of 100 000 cubic metres from coniferous stands currently classified as small-diameter pine. Currently, there is no demonstrated harvesting performance in pine (height class 2) stands.

For pine (height class 2) utilization, a minimum dbh of 9.0 cm is indicated. This criterion is based on Resource Inventory Branch's adaptation of the interior lodgepole pine taper equation.

6.1.2 Volume exclusions for mixed species stands

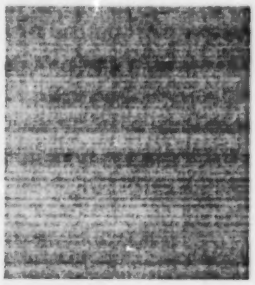
In the Dawson Creek TSA, unlike other areas of the province, all tree species of merchantable size are charged to cut control and therefore contribute to timber supply under current management. Therefore, no reductions to yield estimates to account for unused secondary species will be made.

6. Current Forest Management Assumptions

6.1.3 Minimum harvestable age derivation

The minimum harvestable age is the age at which a stand is estimated to be available for harvest. Harvesting may occur in stands at the minimum harvestable age to meet a harvest target for a short period of time or avoid large and abrupt changes in harvest levels. However, most stands will not be harvested until well past the minimum timber production ages because of management objectives for other resource values (e.g., requirements for the retention of older forest). Table 14 lists the criteria to be used in defining minimum harvestable ages by analysis unit.

Table 14. Minimum harvestable age criteria

Analysis unit	Minimum criteria			Minimum harvestable age
	Height class	Dbh (cm)	Volume (cubic metres per hectare)	
Small pine (4, 9)	2	9.0	120	
Other pine (3, 8, 14)		12.5	120	
Deciduous-leading (5, 6, 11, 12, 16, 17, 18)		12.5	120	
Spruce / balsam (1, 2, 7, 10, 13, 15)		17.5	120	

Data source and comments:

The criteria are based on local knowledge and a review of harvesting performance within the TSA.

Sensitivity analysis will compare the results of applying criteria in Table 14 with those identifying minimum harvestable ages:

1. at which culmination mean annual increment is achieved;
2. at which 95% culmination mean annual increment is achieved.

6. Current Forest Management Assumptions

6.1.4 Harvest scheduling priorities

For various reasons, it may be important to set priorities or minimum harvest levels on certain management zones or analysis units to reflect insect infestations, salvage operations or similar forest management activity. Table 15 provides a description of the harvest activity and the characteristics of the stands to which it applies.

Table 15. Priorities for scheduling the harvest

Description	Management zone or location	Analysis unit	Period (10 year increments)	Minimum harvest level (cubic metres)
Spruce beetle salvage	IRM	1, 7	1-25	50 000
FL 13840 salvage	IRM	1, 7	1	2 700
FL 13840 salvage	IRM	8, 14	1	3 200

Data source and comments:

Information presented in Table 15 is based on local knowledge and a review of the salvage program and harvesting performance within the Dawson Creek TSA.

Salvage operations are considered a priority over harvesting of the timber profile. The salvage program operates with an annual apportionment of 5000 cubic metres per year. A 10-year estimate for salvage of 50 000 cubic metres is presented in Table 15.

Salvage under FL13840 is reported for a 10-year period in Table 15 as actual volume salvaged from currently accessible areas. However, considerably greater volume is potentially available for salvage (refer also to Table 17) depending on costs associated with accessing this volume. In many cases, the cost of road reactivation or development outweighs the value of the volume to be salvaged, based on the market value of wood products.

In the absence of other harvesting priorities, a relative-oldest first harvest rule will be employed.

6.1.5 Silvicultural systems

Table 16 lists the silvicultural systems that are currently employed in the Dawson Creek TSA. Certain practices such as selection harvesting may be geographically specific.

Table 16. Silvicultural systems

Silvicultural system	Eligible analysis units	Annual harvest area (hectares)	% of harvest	Volume retained (%)	No. of harvest entries
Clearcut	1, 3, 7, 8, 10	3 310	53.5	0	1 at harvest rotation
Strip shelterwood	1, 2, 7, 8, 10	1 095	17.7	10	1 at harvest rotation
Group selection	3, 7, 16, 17, 18	28	0.5	70	1 at harvest rotation
Coppice	5, 6, 11, 12, 16, 17, 18	1 751	28.3	0	1 at harvest rotation

Data source and comments:

The above table was based on a review of forest development plans in the TSA as well as TSR I information. Silvicultural considerations specific to riparian or wildlife management are not included (refer to Section 6.4.1, "Forest cover requirements").

Both strip shelterwood and clearcut systems are employed within analysis units 1, 7, 8 and 10 (pure spruce, and spruce-, pine- or balsam-leading). Approximately one-third of areas within these analysis units will be assumed to be harvested using strip shelterwood. To account for volumes retained on the strip shelterwood component of these analysis units, area-weighted yield curves which incorporate a 10 percent volume reduction on one-third of the area will be employed in the timber supply analysis.

Because of the small area harvested using group selection methods (28 hectares), these areas will be modelled as even-aged stands.

6. Current Forest Management Assumptions

6.2 Unsalvaged losses

Table 17 shows the estimated average annual unsalvaged volume loss to catastrophic events such as insect epidemics, fires, wind and root disease over the long term on the timber harvesting land base. This volume will be removed from the modelled harvest forecasts. The unsalvaged loss column reflects only those volumes that will not be recovered or salvaged.

Table 17. Unsalvaged losses

Analysis unit	Cause of loss	Total loss (m^3/year)	Unsalvaged loss
All	Fire	14 395	13 145 m^3/year
All	Wind	15 000	11 400 m^3/year
1, 7	Spruce beetle	30 000	29 640 m^3/year
1, 7	*Innonotus tomentosus*[1]		2.5 m^3/hectare/year

(1) typically occurs in spruce stands under 700 metres elevation of stand age greater than 100 years.

Data source and comments:

The Prince George Regional pathologist and entomologist provided estimates of total losses using forest health data specific to the Dawson Creek Forest District (i.e., 10-year annual average losses); unsalvaged losses were estimated using data from the Dawson Creek Forest District's salvage program (i.e., 5-year annual average losses). This information was supplemented with estimates in the *Forest Insect and Disease Survey, Canadian Forest Service*.

Access to timber for salvage within the Dawson Creeek TSA is dependent on costs associated with development or road reactivation. Where development costs outweigh the value of damaged timber, volumes are deemed economically inaccessible and considered an unsalvaged loss.

6.3 Silviculture

6.3.1 Silviculture and regeneration activities

Regenerating conifer-leading and conifer-leading mixedwood stands will be modelled using the B.C. Forest Service table interpolation program for stand yields (TIPSY) growth and yield model. Existing unmanaged and regenerating pure deciduous, deciduous-leading, and deciduous-leading mixedwood stands will be modelled using the variable density yield projection (VDYP) growth and yield model.

Tables 18a and 18b contain the inputs required to produce the yield tables for this analysis and to model regeneration of stands after projected harvest. A yield table may be constructed by combining a number of tables if more than one regeneration method is used within an analysis unit.

6. Current Forest Management Assumptions

Table 18a. Regeneration assumptions by coniferous-leading analysis units

AU	Composition	Site index	Regen delay (yrs)	OAF 1 (%)	OAF 2 (%)	Regeneration method Type	Regeneration method % of area	Species Code	Species %	Initial density (stems/ha)
1	S > 80%		4	15	5	Plant	100	Sw	100	1 600
2	B > 80%		4	15	5	Plant	100	Sw	100	1 600
				—	—	Natural	70[1]	Bl	100	3 000
3	Pl > 19.4 m > 80%		4	15	5	Plant	100	Pl	100	1 600
				—	—	Natural	5[1]	Pl	100	3 000
4	Pl ≤ 19.4 m > 80%		4	15	5	Plant	100	Pl	100	1 600
				—	—	Natural	5[1]	Pl	100	3 000
7	S 50 > and ≤ 80%		4	15	5	Plant	100	Sw	100	1 600
8	Pl > 19.4 m 50 > and ≤ 80%		4	15	5	Plant	100	Pl	100	1 600
				—	—	Natural	5[1]	Pl	100	3 000
9	Pl ≤ 19.4 m		4	15	5	Plant	100	Pl	100	1 600
				—	—	Natural	5[1]	Pl	100	3000
10	B 50 > and ≤ 80%		4	15	5	Plant	100	Sw	100	1 600
				—	—	Natural	70[1]	Bl	100	3 000
13	S 50 > and ≤ 80% and At/Ac ≤ 50%		4	15	5	Plant	80	Sw	100	1 600
			2	—	—	Natural	20	At	100	20 000
14	P I> 19.4 m 50 > and ≤ 80% and At/Ac ≤ 50%		42	15	5	Plant	80	Pl	100	1 600
				—	—	Natural	20	At	100	20 000
15	Conifer % 50 > Decid ≤ 50%		4	15	5	Plant	80	Sw	50	1 600
			2					Pl	50	1 600
				—	—	Natural	20	At	100	20 000

(1) reflects proportion of area subject to natural ingress and advance regeneration of balsam fir (AUs 2 and 10) or lodgepole pine (AUs 3, 4, 8 and 9).

6. Current Forest Management Assumptions

Table 18b. Regeneration assumptions by deciduous-leading analysis units

AU	Composition	Site index	Regen delay	OAF 1	OAF 2	Regeneration method Type	Regeneration method %	Species Code	Species %	Initial Density (stems/ha)
5	At > 80%		3	—	—	Natural	100	At	100	20 000
6	Ac > 80%		3	—	—	Natural	100	Ac	100	5 000
11	At > 50 and ≤ 80%		3	—	—	Natural	100	At	100	20 000
12	Ac > 50 and ≤ 80%		3	—	—	Natural	100	Ac	100	5 000
16	At > 50 and ≤ 80%		3	—	—	Natural	80	At	100	20 000
			4	15	5	Plant	20	Sw	100	1 600
17	Ac > 50 and ≤ 80%		3	—	—	Natural	80	Ac	100	5 000
			4	15	5	Plant	20	Sw	100	1 600
18	Deciduous % > Conifer %		3	—	—	Natural	80	At	50	20 000
			3	—	—			Ac	50	5 000
			4	15	5	Plant	20	Sw	100	1 600

Data source and comments:

In addition to artificial stocking, natural densities for both balsam (subalpine) fir and pine are conservatively estimated at 3,000 stems per hectare based on survey records, and local MoF and conifer licensee silviculture knowledge.

Approximately 15% of pure balsam, balsam-leading, pure spruce and spruce-leading stands that are harvested using a strip shelterwood silviculture system in the ESSF support advance regeneration of balsam fir. To ensure that spruce is included as a stand component for economic considerations, these stands are planted to spruce. It is anticipated that balsam fir will develop as a co-dominant stand component, and will compete with the planted spruce. The resultant stand is expected to represent a conifer mixedwood.

Use of class A seed is limited to silviculture trials within the ESSF wk2. Therefore no genetic gain will be assumed in the analysis.

An area-weighted regeneration delay period was estimated for each analysis unit using ISIS/MLSIS records. Estimates were developed for post-1987 silviculture openings; and for naturally and artificially regenerated stands.

Operational adjustment factors (OAFs) are used to adjust timber yield estimates to account for operational factors. OAF1 is a constant percentage reduction to account for small stocking gaps within stands. OAF2 accounts for losses that increase with stand age, for example decay due to disease. Provincial average operational adjustment factors (OAFs) values will be applied to the managed stand yield curves in the base case. Local OAFs are being developed and reviewed by BCFS staff based on ISIS/MLSIS information. If available at the time of the analysis, local OAFs may be used instead of the provincial average values.

6.3.2 Immature plantation history

Table 19 summarizes areas of existing immature forest where the stand density (stems per hectare) has been controlled, therefore justifying the assignment of stands to managed stand yield tables (MSYT).

Table 19. Immature plantation history

Analysis unit	Area managed (%) age 1 – 12 yrs
1	100
2	100
3	100
4	100
5	0
6	0
7	100
8	100
9	100
10	100
11	0
12	0
13	100
14	100
15	100
16	0
17	0
18	0

Data source and comments:

All conifer stands aged 12 years and under in the Dawson Creek TSA have had some form of density control (i.e., brushing) or plantability/stocking survey which indicates the stands are well-spaced or free-growing, and therefore shall be considered to be managed.

Deciduous stands and any stands harvested over 12 years ago shall be considered as unmanaged stands. Stands harvested over 12 years ago were either clearcut or partially harvested using diameter-limit selection systems, and were allowed to regenerate naturally. Similarly, existing deciduous stands are typically clearcut and allowed to regenerate naturally; therefore, their growth and yield will be projected using a natural (unmanaged) stand yield model (VDYP).

6. Current Forest Management Assumptions

6.3.3 Not satisfactorily restocked (NSR) areas

Land classified in the Dawson Creek TSA FIP file as type identity 4 or 9 is included in the current timber harvesting land base. These type identities indicate not satisfactorily restocked land base. The purpose of this section is to identify the total area of NSR currently existing in the timber harvesting land base, and the estimated rate at which the NSR area will be restocked.

Table 20. Not satisfactorily restocked (NSR) areas

Analysis unit	Area of NSR (hectares)						
	Total area (hectares)	Grazing related NSR	% grazing related NSR	Restocked	Restocking schedule by period		
					yrs 1–10	yrs 11–20	> 20 yrs
1	2 815	158	6	400	800	800	815
2	19			19	0	0	0
3	3 886	53	1	500	1500	1500	386
4	598			100	100	100	298
5	449	129	29	150	150	0	149
6	246			150	96	0	0
7	4 771	96	2	1400	1500	1500	371
8	1 922	37	2	800	550	572	0
9	1 507			300	500	500	207
10	463			200	100	100	63
11	1 427	685	48	800	100	100	427
12	12			12	0	0	0
13	581	155	27	100	150	150	181
14	498	43	15	200	100	100	98
15	1386			659	300	300	127
16	422	59	14	100	100	100	122
17	83			83	0	0	0
18	1398			671	300	300	127
Total	22 483	1415		6644	6346	6122	3371

Data source and comments:

Data were obtained from the Integrated Silviculture Information System (ISIS) and the Major Licensee Silviculture Information System (MLSIS) databases.

6.3.4 Rehabilitation areas

The Dawson Creek TSA includes areas classified as non-commercial brush and backlog NSR that do not currently contribute to timber production. The current silviculture program includes plans to rehabilitate approximately 1500 hectares of the backlog NSR areas. Table 21 summarizes the areas and associated treatment schedule.

Table 21. Rehabilitation areas

Analysis unit	Rate of restocking (hectares/decade)	Treatment area (hectares)	Rehabilitation criteria
1 (Spruce – pure)	1000 hectares / years 1–10	1 000	NSR
1 (Spruce – pure)	500 hectares / years 11–20	500	NSR
Total	1500 hectares / 20 years	1500	

Data source and comments:

Backlog (pre-1987) areas currently designated as NSR are being rehabilitated and planted with conifer growing stock. Some of these sites, although labelled NSR, are occupied by non-commercial deciduous species according to local silviculture knowledge.

The Dawson Creek Forest District will rehabilitate (i.e., mechanically site prepare and plant to spruce) only a small portion of the total backlog NSR area. Of the 15 000 hectares of backlog NSR in the TSA, approximately 10% has been surveyed and will be rehabilitated according to the schedule in Table 21. Priority areas for treatment are those openings that previously supported pure spruce stands.

Additional surveys will need to confirm acceptable stocking in backlog NSR areas. The forest district intends to target only areas requiring full rehabilitation. Currently, there are no plans to rehabilitate age class 9 balsam stands to pure spruce stands, or to rehabilitate pine (height class 2) stands to normal profile pine stands.

6.4 Integrated resource management

6.4.1 Forest cover requirements

As noted in Section 4.1, "Management zones, groups and multiple objectives," the Dawson Creek TSA is divided into management zones which define areas of distinct management emphasis and similar forest cover. Since the computer simulation model used for the timber supply analysis can track multiple objectives for an area, management zones can overlap. For example, a landscape unit that is managed for biodiversity may be partly covered by a visually sensitive area. The objectives for each area may specify requirements to retain different forest characteristics across the landscape, such as a minimum percentage of old-growth forests or a maximum percentage of forest area below green-up height.

Table 22 lists the forest cover requirements that will be applied in the various zones to represent current management. The role of non-contributing forest (productive forest which does not contribute to the timber harvesting land base) in achieving forest cover requirements (i.e., maximum allowable disturbance or minimum area of retention) will be considered in the analysis.

6. Current Forest Management Assumptions

Table 22. Forest cover requirements

Zone	Maximum allowable disturbance (% area)	Green-up height (metres)	Minimum retained area (%)	Minimum age or height for retention	Area of application	Source of prescription
Integrated resource management areas	33	3		Use slope classes[a] to modify maximum allowable disturbance area % for coniferous and deciduous analysis units	Timber harvesting land base (THLB)	Application of cutblock adjacency requirements for TSA by landscape unit (LU)
VQO: General Retention Partial retention Modification	 33 5 10 20	 3 5 5 5		Use slope classes to modify maximum allowable disturbance area % for coniferous and deciduous analysis units	Crown forested area	Visually effective green-up uses cutblock adjacency requirements for TSA for General VQO; and *Factoring Visual Resources into Timber Supply Analysis*
Caribou management zone	33	3	> 44% mature + old seral forest of which ≥ 11% is old seral forest	> 44% mature + old seral forest of which ≥ 11% is old seral forest	Crown forested area	Expert advice from Dale Seip (MOF); Randy Sulyma / Darwyn Coxson (UNBC) and Dave King, (MELP)
Grizzly bear management zone	33	3	Early seral retention % for 'Intermediate' biodiversity emphasis in NDT's 1 and 2	Early seral retention % for 'Intermediate' biodiversity emphasis in NDT's 1 and 2	Crown forested area	Expert advice from Dale Seip (MOF) and Dave King, (MELP)

(a) Slope classes are listed in Table 6 of *Factoring Visual Resources into Timber Supply Analysis.*

Data source and comments:

Habitat requirements of caribou and grizzly bear are consistent with the Dawson Creek LRMP. Caribou habitat is managed to ensure that an area greater than 44% of the Crown forested land base is retained in mature plus old seral forest, and of this area, at least 11% is retained in an old seral condition. Sensitivity analysis may be conducted to examine the effects of extending the harvest rotation by 30 years as a means of reducing habitat fragmentation. In addition, a sensitivity analysis is intended that will explore the potential impacts of excluding most pure pine stands with greater than 90% cover and site indices less than 15 in an effort to represent Crown forest suitable for terrestrial lichen growth.

Grizzly bear habitat is managed to retain early seral forest based on percentages specified in the *Biodiversity Guidebook* for an intermediate biodiversity emphasis in NDT's 1 and 2. Early seral conditions are important to ensure adequate foraging habitat for grizzly bears. Interim strategies for managing grizzly bear habitat include vegetation management, one-sided drainage development, and seasonal access constraints.

6.4.2 Landscape-level biodiversity

Table 23a lists the draft biodiversity emphasis assigned to each landscape unit. In the analysis, old seral stage requirements reflecting a weighted biodiversity emphasis option (BEO) consistent with current provincial policy (45% lower, 45% intermediate, 10% higher) will be applied to each draft landscape unit. The specific forest cover requirements to be applied in the analysis were derived from the *Landscape Unit Planning Guide* and are summarized in Table 23b. A sensitivity analysis will examine the impact of applying draft BEOs and the corresponding old seral requirements.

Table 23a. Draft landscape unit biodiversity emphasis assignment

Landscape unit number	Landscape unit name	Draft biodiversity emphasis
1	Narraway	Intermediate
2	Belcourt	Intermediate
3	Red Deer	Intermediate
4	Wapiti	Intermediate
5	Monkman	Intermediate
6	Kinuseo	Intermediate
7	Flatbed	Intermediate
8	Redwillow	High
9	One Island	Intermediate
10	Puggins	Low
11	Wolverine	Intermediate
12	Imperial	High
13	Upper Sukunka	Intermediate
14	Burnt River	High
15	Lower Sukunka	Low
16	Gwillim	Intermediate
17	Lower Murray	Low
18	Kiskatinaw	Low
19	Dawson Creek	Low
20	Septimus	Intermediate
21	Pine River	Low
22	Hasler	Low
23	Beaudette	Intermediate
24	Pine Pass	Intermediate
25	Upper Moberly	Intermediate
26	Carbon	Intermediate
27	Gething	Low
28	Johnson Creek	Low
29	Lower Moberly	Low
30	Peace River	Intermediate
31	Beryl Prairie	Low
32	Dunlevy	High

Source: Dawson Creek Draft Landscape Unit Planning Strategy (June 1999).

6. Current Forest Management Assumptions

Table 23b. Landscape unit biodiversity requirements within the Dawson Creek TSA.

			Mature and old-seral stage		Old-seral stage			
					Minimum retention area (%)			
Biogeoclimatic unit	NDT	Biodiversity emphasis	Minimum retention area (%)	Minimum age (years)	Now	71 years	141 years	Minimum age (years)
ESSF	1	Low	-	-	14.2	17.1	19.9	250
ESSF	1	Intermediate	-	-	19	19	19	250
ESSF	1	High	-	-	28	28	28	250
ESSF	2	Low	-	-	6.7	8.1	9.4	250
ESSF	2	Intermediate	-	-	9	9	9	250
ESSF	2	High	-	-	13	13	13	250
SBS	2	Low	-	-	6.7	8.1	9.4	250
SBS	2	Intermediate	-	-	9	9	9	250
SBS	2	High	-	-	13	13	13	250
BWBS-c[a]	3	Low	11	100	8.2	9.9	11.5	140
BWBS-c	3	Intermediate	23	100	11	11	11	140
BWBS-c	3	High	34	100	16	16	16	140
BWBS-d[b]	3	Low	13	80	9.7	11.7	13.6	100
BWBS-d	3	Intermediate	23	80	13	13	13	100
BWBS-d	3	High	34	80	19	19	19	100

(a) BWBS with coniferous species prominent
(b) BWBS with deciduous species prominent

6.4.3 Reductions to reflect volume retention in cutblocks

Volume may be retained within cutblocks to achieve a variety of forest management objectives including biodiversity and the maintenance of riparian ecosystems.

Riparian management zones (RMZ)

For the base case, only riparian reserve zones will be excluded from the timber harvesting land base since timber retention within the riparian management zone is not currently practiced within the TSA (refer to Section 5.2.11, "Riparian reserve and management zones"). Sensitivity analysis will examine the impact on timber supply of applying the average basal retention levels identified in the *Riparian Management Area Guidebook* for the riparian management zone.

Wildlife trees (WT) and wildlife tree patches (WTP)

The *Landscape Unit Planning Guide* describes two methods for maintaining stand structure over time. One method uses wildlife trees while the other uses wildlife tree patches (WTPs). The Dawson Creek Forest District's current practice is the retention of wildlife tree patches. Because of extensive windthrow hazard, the retention of individual wildlife trees is uncommon.

Table 24 summarizes the forest district's current level of wildlife tree patch retention by landscape unit, based on information from forest development plans and silviculture prescriptions. The table also lists the per cent retention recommended in the *Dawson Creek Draft Landscape Unit Planning Strategy* (June 1999), consistent with *the Landscape Unit Planning Guide (Table A3.1)* recommendations for wildlife tree retention.

In Table 24, the column labelled "Landscape unit strategy WTP" lists the recommended average WTP%, area weighted by BEC variant, for each landscape unit. The "Internal WTP" and "External WTP" values are based on a survey of recent cutting permits and harvesting. WTP retention values in parentheses indicate that no current harvesting data were available for the landscape unit. These values were estimated using the average WTP per cent retention for all landscape units within each biodiversity emphasis assignment (i.e., low, intermediate, high) where current harvesting data were available. All retention percentages in Table 24 apply to the total forested land base.

There is some uncertainty about the reasons for the differences between the LU strategy recommendations and the survey findings. One uncertainty is the total area to which existing WTPs will ultimately apply. For the analysis, the LU strategy recommendations will be applied, with the assumption that over time retention practices will align with the strategy. According to the May 15, 2000 memorandum from Ministry of Forests and MELP assistant deputy ministers regarding provincial WTP recommendations, it will be assumed for the analysis that 50% of the overall WTP requirements must be achieved on the timber harvesting land base.

6. Current Forest Management Assumptions

Table 24. Reductions to reflect volume retention in cutblocks

Landscape unit		Draft BEO (L, I, H)	Internal WTP (%)	Adjacent WTP (%)	Total WTP by landscape unit (%)	Landscape unit strategy WTP (%)
Number	Name					
1	Narraway	I	(8)[1]	(6)	14	5
2	Belcourt	I	3	14	17	4
3	Red Deer	I	2	10	12	5
4	Wapiti	I	8	0	8	4
5	Monkman	I	19	10	29	2
6	Kinuseo	I	17	0	17	3
7	Flatbed	I	8	7	15	6
8	Redwillow	H	14	0	14	4
9	One Island	I	12	4	16	6
10	Puggins	L	12	5	17	6
11	Wolverine	I	(8)	(6)	14	7
12	Imperial	H	2	0	2	5
13	Upper Sukunka	I	6	2	8	5
14	Burnt River	H	(8)	(0)	8	8
15	Lower Sukunka	L	(7)	(7)	14	7
16	Gwillim	I	15	0	15	5
17	Lower Murray	L	0	28	28	6
18	Kiskatinaw	L	5	0	5	7
19	Dawson Creek	L	(7)	(7)	14	7
20	Septimus	I	(8)	(6)	14	7
21	Pine River	L	2	13	15	7
22	Hasler	L	17	0	17	7
23	Beaudette	I	2	16	18	7
24	Pine Pass	I	0	0	0	5
25	Upper Moberly	I	(8)	(6)	14	8
26	Carbon	I	(8)	(6)	14	8
27	Gething	L	(7)	(7)	14	8
28	Johnson Creek	L	9	0	9	7
29	Lower Moberly	L	7	3	10	6
30	Peace River	I	(8)	(6)	14	6
31	Beryl Prairie	L	(7)	(7)	14	6
32	Dunlevy	H	(8)	(0)	8	6

(1) The per cent retention indicated in parentheses is an average of the WTP per cent retention recommended for the biogeoclimatic variants that occur within each landscape unit, weighted by the timber harvesting land base in each variant.

6. Current Forest Management Assumptions

Data source and comments:

Cutblock information was sampled from the most current (1999) approved forest development plans and silviculture prescriptions for the major licensees that operate in the Dawson Creek TSA: Canadian Forest Products Ltd., West Fraser Mills Ltd., Louisiana Pacific Canada Corp., and the Small Business Forest Enterprise Program. The total area sampled represents approximately 11 000 hectares in gross cutblock area. To improve representation of each licensee's harvesting practices within the TSA, cutblocks were sampled from the principal physiognomic regions of the TSA - the plateau, the foothills, and the mountains.

Wildlife tree patches were also assessed for their representation of pre-harvest stand composition, and whether they include riparian reserve area or some other type of exclusion (Table 25). Where WTP representation does not distinguish between internal or adjacent WTP location (as in non-commercial brush), the feature occurs similarly in both types of WTP. The majority of wildlife tree patches represent pre-harvest stand composition. However, instances of wildlife tree patches comprised of aspen/cottonwood, NSR area, non-productive cover, or non-commercial brush also occur. Table 25 is provided for information only, however, it does indicate that some WTPs do not represent pre-harvest conditions, and given the non-productive cover components, further highlights the uncertainty about the overall area to which the existing WTPs apply.

Where wildlife tree patches exist, they are generally greater than two hectares in area and ,are considered to contribute to old seral forest at the landscape unit level. The timber harvesting land base occupied by wildlife tree patches is considered unavailable for one harvest rotation.

Table 25. Wildlife tree patch representation

WTP representation	Frequency of occurrence (% of cutblocks)	Proportion of cutblock gross area (%)
Pre-harvest stand composition	58.5	7
At/Ac within conifer stand	3.6	16
Riparian – internal	1.8	22
Riparian – adjacent	7.2	5
Non-productive cover — internal	5.4	6
Non-productive cover — adjacent	16.3	4
Non-commercial brush	5.4	8
NSR — adjacent	1.8	12

6.4.4 Livestock grazing

Livestock grazing is an important activity within the Dawson Creek TSA. Grazing activities occur on areas subject to Crown grazing leases, grazing permits and on Community Pastures. Estimates of tree productivity loss associated with cattle grazing have not been quantified for the Dawson Creek TSA, yield projections cannot be confidently adjusted to reflect cattle grazing impacts. Similarly, the relative gain in tree productivity associated with deferring cattle grazing in the short term is unknown.

Sensitivity analysis will be used to examine the impacts of lower stocking at free-growing on a portion of the grazed area. Specifically, community pastures will be combined with range tenures (grazing permit areas and grazing leases) in a sensitivity analysis that models reduced stocking levels on 30% of range areas. Stocking levels of 350 conifer stems per hectare at free-growing and 1000 deciduous stems per hectare at free-growing will be applied to 30% of range areas.

7. Sensitivity Analyses

Sensitivity analysis provides a perspective on the timber supply impact of uncertainty in management assumptions and/or data. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most influence results.

Table 26 includes some standard sensitivity analyses as well as some aimed at exploring issues particular to the Dawson Creek TSA.

Table 26. Sensitivity issues

Issue to be tested	Sensitivity levels	Data source/comments
Existing land base	+/– 10 % land base change. Exclude ALR area from the timber harvesting land base after one rotation.	Ownership is of concern since it has not been updated for several years (refer to Section 5.2). Future potential reduction to the deciduous harvest flow.
Physical operability	No aerial harvesting.	Revised physical operability.
Riparian retention	Assume retention in riparian management zone.	*Riparian Management Area Guidebook* and riparian overlay.
Minimum harvestable age	Model age at which 95% of culmination volume is achieved; model age at which culmination volume is achieved. Model +/– 10 and 20 years.	Refer to Table 14 and associated comments.
Harvest scheduling priorities	Random harvest rule.	Relative oldest first used as base case
Site index estimate for older stands	Adjust SI with equations provided by Research Branch	Recent OGSI paired plot initiative.
Existing stand yields	+/- 10%	
Regenerated stand yields	Use locally-derived OAFs, pending review and interpretation	Standard provincial OAF1 of 15% and OAF2 of 5% used as base case.
Impediments to regeneration — cattle grazing	Model reduced stocking of 350 stems/hectare conifer and 1000 stems/hectare deciduous on 30% of grazing areas.	Grazing reserves and grazing tenures inventories.
Additional small pine volume	Include stands with < 17.5 metres height and > 120 cubic metres per hectare.	Licensees are considering these stands as merchantable. No pine stands <17.5 m tall included in base case
Caribou management	Extend the harvest age by 30 years.	Reduction in rate of habitat fragmentation in Caribou management zone.
	Apply 90% reduction to leading pine stands > 90% cover where site index < 15.	Representation of Crown forested land base suitable for terrestrial lichen growth.

(continued)

Table 26. Sensitivity issues (concluded)

Issue to be tested	Sensitivity levels	Data source/comments
Visual quality objectives (VQO)	Maximum % alteration +/– 1 VQO class.	Visual landscape inventory, TRIM slope data; and slope classes identified in Table 6, *Factoring Visual Resources into Timber Supply Analysis.*
Visually effective green-up (VEG)	+/– 1 metre height.	Visual landscape inventory, TRIM slope data; and slope classes identified in Table 6, *Factoring Visual Resources into Timber Supply Analysis*
Stand-level biodiversity (wildlife tree retention)	Apply WTP retention requirements from *Landscape Unit Planning Guide* (LUPG).	Compare current practice with WTP % retention recommended in *Landscape Unit Planning Guide.*
Landscape level biodiversity	Model draft BEO's	Based on regional landscape unit planning strategy.
Landscape unit seral retention	Adjust seral retention % for NDT 1 to that of NDT 2.	Forest licensee concern that some BEC variants in ESSF incorrectly represented.
LRMP: approved PAS areas	Exclude Goal 1 and 2 areas from the timber harvesting land base.	LRMP database (PAS — resource management zone); Order-in-Council (OIC) boundaries for approved protected areas.